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ABSTRACT

An earlier report presented preliminary findings on the wider benefits of higher education in England, drawing on data collected at age 33 from the National Child Development Study, based on a cohort born in 1958 and a sample of more than 16,000. This report updates the earlier conclusions through new findings from a more extensive analysis involving both the earlier study and the more recent 1970 British Cohort Study, in which 11,300 adults participated. This analysis incorporates data collected in 2000 to compare 30-year-olds in both studies and the 42-year-olds of the earlier study. Data demonstrated a rise in the number of graduates between the 1958 and 1970 cohorts, with much the same levels of mobility in both groups. Graduates were generally less depressed than nongraduates, and reported a sense of well being that was higher than that of people at lower qualification levels. Despite the expansion of the graduate population, there was little evidence of reduced benefits in the labor market for graduates. Graduates were significantly less likely to be unemployed over the period from age 25 to age 30 than were those with lower educational attainment. Graduates were still more likely to show upward social mobility, although this effect was reduced in the later cohort. Graduates were more tolerant toward other races, less accepting of authority, and less politically cynical. As a consequence, graduates were more likely to vote and were more likely to be involved in parent teacher associations. There was evidence that college graduates tended to read more to their children. All of these findings indicate that in terms of a political agenda that sees social cohesion as a primary goal, the expansion of higher education to produce more college graduates can only be seen as beneficial. Three appendixes contain information about educational categories, study methodology, and outcome variables. (Contains 2 tables, 43 figures, and 13 references.) (SLD)

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ED 476 448

Revisiting the benefits of higher education

A report by the Bedford Group for Lifecourse and Statistical Studies, Institute of Education

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Executive summary

The economic returns to higher education (HE) in terms of enhanced earnings are well established. The wider set of 'non-economic benefits' in the areas of health, generic skills and citizenship are less widely recognised. In an earlier report[1], we presented preliminary findings on the wider benefits, drawing on data collected at age 33 from the National Child Development Study, based on a cohort born in 1958. This report updates the earlier conclusions through new findings from a more extensive analysis involving both the earlier study and the more recent 1970 British Cohort Study. The current analysis incorporates data collected in 2000 to compare 30 year-olds in both studies and with 42 year-olds in the earlier of the two studies.

We report findings in five major areas. First, we examine the mobility of graduates. To what extent do some parts of the country gain and lose graduates and graduate types of occupation at the expense of others? We then report findings on the 'marginal returns' to higher education in four domains of life: health, labour market, citizenship and values, and parenting.

Geographical mobility of graduates

Comparing the location of graduates there is considerable movement from other parts of the country to the South East and South West of England, which tends to reverse from the early thirties to forties as people move back from these more popular areas. This is also reflected in the occupations entered, which show a gain in professional occupations in the 'graduate areas' while a loss in these areas of people in skilled occupations was evident. This differential gain and loss was not evident in other parts of the country. These data also demonstrated a rise in the graduate population between the 1958 and 1970 cohorts but showed much the same levels of mobility in both of them.

Health benefits

Graduates were generally less depressed; they also reported a sense of well being that was higher than for people at lower qualification levels. Despite the general rise in depression levels between the 1958 and 1970 cohorts and in the 1958 cohort between ages 33 and 42, the findings suggest that this had little impact on the levels of depression in graduates relative to other groups. Levels of obesity, particularly among women, were also lower among the graduate population. In each of these cases the two levels of higher education, degree and below degree level qualifications, showed an additional benefit for those gaining a degree. With respect to smoking, graduates were less likely to smoke and more likely to give up; however, the amount smoked appeared to differ little across the qualification levels.

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[1] Bynner, J. and Egerton, M. (2001) *The Wider Benefits of Higher Education*. London: Higher Education Funding Council for England.

Labour market outcomes

With the expansion of the graduate population it was possible that we might see reduced benefits in the labour markets for graduates in the 1970 cohort compared with graduates in the 1958 cohort. With respect to probability of unemployment, there was little evidence of such a cohort shift. Graduates were significantly less likely to be unemployed over the period from age 25 to 30 than young people with lower qualification levels. With regard to social mobility, there was also a clear gain in terms of moving up the social class scale compared with the position of one's parents. However, with the general rise of occupational levels in society and the expansion of graduate occupations, the effect, though still present, was reduced. Graduates demonstrated their suitability for modern types of employment through higher levels of multi-skilling compared to other groups. They were also far more likely to have gained computer skills and to be using them at work than other groups; although both these benefits were more attached to below degree level HE rather than degree level HE. Furthermore, although the levels of computer use differed considerably depending on respondents' occupations, the pattern of qualification differences was sustained, i.e. there was a clear higher education effect.

Citizenship and values

Graduates were more tolerant towards other races than other groups with a clear boost attached to gaining a degree. They were also less blindly accepting of authority and less politically cynical. The last of these attitudes was reflected in a higher probability of voting in general elections than among other groups. They were also more active in their communities through attendance of voluntary associations. Those who were parents were more likely to be involved in Parent Teacher Associations (PTAs), with the tendency strongest in the more recent cohort whose children tended to be older. Overall, therefore, it was clearly the case that graduates were making a significant contribution to their community.

Benefits to graduates' children

Finally, we examined the possible intergenerational transfer of benefits from graduates to their children using a restricted sample from the National Child Development Study of one third of cohort members and their children. Because numbers were small and all possible effects were difficult to control statistically, the results were more equivocal than in some other areas. However, there was evidence that graduates tended to read more to their children and that their children owned more books. Children of graduates also demonstrated enhanced scores in reading and mathematics.

Conclusion

Despite the expansion of the graduate population between the 1958 and the 1970 cohorts, the results of this analysis give striking evidence that the benefits from this increase are sustained across a wider section of the population. In the domains of health, the labour market, citizenship and parenthood, young people with experience of higher education seem, over and above their other attributes, to profit significantly. Although some of these benefits are clearly in the private interest of individuals in enhancing their own quality of life through enhanced earnings and consumption, others have indirect benefits to the economy such as cost savings to the health service. In relation to the evidence on citizenship and values, the benefits may be seen as even more relevant to society to that of individual gain. In terms of a political agenda that sees social cohesion as a primary goal, the expansion of higher education to produce more graduates can only be seen as beneficial.

1. Introduction

a) Background

1.1 Higher education (HE) can be considered to benefit both the individuals who receive it and the society in which they reside. A degree signals a package of experiences and competences with high labour market utility, as is reflected in the well-established return to earnings from getting a degree (Blundell et al., 1997). The economic impact of such 'human capital' acquisition is seen not only in earnings but also in the raised demand for goods and services that follows and in the increased contribution to the tax base.

1.2 In a previous report, we presented an additional range of benefits that could also be attributed to gaining a degree (Bynner and Egerton, 2001). Graduates were less likely to be unemployed than non-graduates and were likely to possess a range of general skills from computing to communicating. They were also more likely to be physically and psychologically healthy and to have a healthier life style. These benefits, though clearly having private value, also have an impact on 'externalities' that contribute to the economy indirectly (Michael, 1973; Behrman and Stacey, 1997). A skilled and healthier population is not only contributing to workplace efficiency, but places less demand on public services, such as the NHS. Graduate parents also reported more frequently an educationally supportive home environment, signifying a potential intergenerational transfer of human capital and consequent economic returns. Finally graduates were also more likely than non-graduates to participate in community and voluntary organizations, to be interested in politics and to express democratic and tolerant views. These last 'democratic returns' may not have direct or indirect economic effects, but are critical to the fostering of social capital – on which social cohesion depends (Baron, Field and Schuller, 2000).

1.3 The previous research was restricted to analysis of data collected in one major longitudinal study, the 1958 cohort study (National Child Development Study), which has followed a sample of over 16,000 people from birth to adult life. At the time of the previous research, longitudinal data had been collected in a series of follow-up surveys up to age 33, when 11,500 people participated. Analysis focused on outcomes at age 33, posing the question: 'to what extent does higher education, over and above acquiring A Levels, impart to the individuals who receive it a number of distinct benefits?'

1.4 The new analysis reported here extends the earlier work in a number of ways. We are able to capitalise on new data collected in the most recent survey at age 42 in the 1958 cohort on over 11,500 study members. This means we can determine whether the benefits to graduates observed at age 33 were sustained or changed as the cohort grew older – an *age effect*. We are also able to draw

on data collected in the same year, 2000, in the 1970 British Cohort Study (1970 cohort), who had reached age 30 at the time of the survey. The 1970 cohort parallels the 1958 cohort in collecting data throughout the life of a cohort of similar size, but born twelve years later, from birth to adulthood. This allows us to compare the benefits identified among 33 year-olds in 1991 in the last report with those for 30 year-olds nine years later in 2000. This comparison helps to reveal *cohort effects*, i.e. whether any changes in the higher education student population, such as its expansion, have increased or diminished the benefits of HE. Finally, in the relatively rare cases when the 42 year-olds in the 1958 cohort are more similar to the 30 year-olds in the 1970 cohort (2000 survey) than they are to the 33 year-olds in the 1958 cohort (1991 survey), we have to conclude that changes in society (government, policies, economy) are overriding the effects of age and cohort at the time of the different surveys. We have evidence of a *period effect*.

1.5 The cohort study surveys cover the whole country, which enables us to examine another phenomenon of interest – the mobility of graduates. To what extent do certain parts of the country gain graduates at the expense of others taking the wider benefits of HE with them? Is the amount of mobility changing as the HE population expands?

b) Scope of the research

1.6 The 1958 cohort began with a perinatal mortality survey of every baby born in a week in March in 1958 – over 16,000 children. Follow-up occurred at ages 7, 11, 16, 23, 33 and 42, when 11,500 of the original cohort were still participating. The 1970 cohort follows the same pattern, starting with all births in a week in April 1970 and with subsequent follow-ups at ages 5, 10, 15, 26 and 30. 11,300 participated in the survey at age 30. During the cohort members' childhood the data was collected by health visitors from parents and from children through educational and medical assessments. Teachers also supplied information. Through adulthood data has been collected direct from cohort members through structured interviews.

Outcomes investigated

1.7 In this report we examine a number of different phenomena. First, to reflect the comprehensive geographical coverage of both studies we assess the net gains and losses of graduates since birth in each of the ten standard regions of Great Britain. We also investigate the extent to which this movement is further reflected in the occupations entered – focussing on professional as opposed to 'intermediate' and 'skilled' jobs. Second, we extend analysis beyond the original set of outcomes reported previously (Bynner and Egerton, 2001) to a wider range of potential benefits. Full measurement details of each of them are supplied in the different results sections of the report.

Health benefits

1.8 Under health benefits we examine the impact of higher education on psychological state, as measured by the 'Malaise Inventory' (Rutter et al., 1970), a 24 item scale comprising symptoms of depression, and on general health, by an overall self-rating ranging from 'excellent' to 'poor'. This time we also include obesity as measured by the 'Body Mass Index' (weight relative to height) as an indicator of a healthy lifestyle. In relation to health behaviour we examine the probability of being a smoker and the number of cigarettes smoked. A number of other outcomes were also examined but found to have a weak or non-significant relationship with higher education status. These included the presence of asthma, eczema and high blood pressure, stress related disorders, the incidence of bronchitis, tendency to alcoholism and amount of aerobic exercise performed. As none of these health outcomes bore any statistically signification relationship to HE experience, the results are not reported.

Labour market

1.9 The next set of outcomes relate to labour market issues. We return to the question of employability. To what extent do graduates tend to gain and retain employment following graduation to a greater extent than individuals without the benefit of HE? We also investigate the social mobility question. To what extent does HE give a particular boost to young people who start off from disadvantaged circumstances in rising up the occupational ladder? And is there a cohort effect; that is to say, with the expansion of the graduate population, are such mobility returns to HE reducing and are men and women affected differently?

1.10 A particular focus of interest in graduate employment is the range of skills or competencies that graduates possess which make them particularly attractive to employers. In the modern labour market there is said to be an increasing demand for flexible and multi-skilled individuals who can operate effectively against a range of job related tasks, many of which are in flux through technological change. Britain is said to have lagged behind other economies in the extent to which its education system prepares young people for this new environment. We want to know to what extent graduates are multi-skilled compared with other members of the labour force, and whether, at least at the graduate end of employment, such multi-skilling characterises the jobs graduates enter. A key skill within the battery of accomplishments that young people increasingly need is computing. We use information collected about the use of computers at work, and in other places, to identify acquired skills in this area and assess the extent to which HE supplies an added benefit to graduates in this respect.

Civic participation and attitudes

1.11 The next section of the report deals with social attitudes and participation. We compare the value orientations of graduates to those of non-graduates in three domains: race tolerance, support for authority and political cynicism. In relation to our interest in social capital accumulation, we also investigate the extent of graduate voting in general elections and graduate involvement, compared to non-graduates, in charitable and voluntary activities. For those who have children, we also look at their engagement in Parent Teacher Associations – a strong indicator of community participation.

Parenting and intergenerational effects

1.12 Finally we examine the qualities of graduates as parents. To what extent do children of graduates grow up in a relatively richer educational environment, as indicated by the number of books in the house? And do parents read to their children? In the 1991 survey of the 1958 cohort, one third of the families took part in a special survey in which the children of cohort members were assessed on a number of cognitive and behavioural scales. We draw on this data to assess the extent to which graduate parents have children with superior test scores, taking account of other circumstances and experiences that might affect them.

2. Data and methodology

2.1 First, the aims of the study required a classification of qualifications – highest qualification achieved – which would distinguish HE participants from others.

2.2 We used two types of classification. For analysis involving comparison between cohorts (1958 cohort and 1970 cohort) and across ages (1958 cohort) we used a four-category classification as set out below. The full set of qualifications encompassed by this scale is supplied in Appendix 1. For certain analyses using the 1958 cohort, following the approach used previously (Bynner and Egerton, 1991), we added an additional category of 'HE dropout' comprising those cohort members who had embarked on an HE course but had not completed it. There were 286 dropouts at age 33 and 195 remained so at age 42.

Highest qualification groupings used in this study (see Appendix 1)

Degree or higher
Sub-degree or equivalent
Dropouts from HE (1958 cohort only)
A Levels or equivalent
Below A Levels

Table 2.1 shows the distribution of cohort members across the four qualification levels for the 1970 cohort at age 30 and for the 1958 cohort at ages 33 and 42.

***Table 2.1:** Highest qualification classification*

Highest qualification	1970 cohort at 30 (%)	1958 cohort at 33 (%)	1958 cohort at 42 (%)
Degree or higher	20	13	17
Sub-degree or equivalent	12	14	15
A Levels or equivalent	14	16	16
Below A Levels	54	57	52
N (100%)	11,217	11,330	11,380

2.3 The rising participation in higher education can be seen from the 20% in the 1970 cohort at age 30 who had gained a degree, compared with 13% who had gained a degree in the 1958 cohort by age 33 and 17% by age 42. Non-degree level higher education qualifications accounted for another 12% to 15% in the two cohorts. At the other end of the scale, just over one in ten had not gained any qualifications at all (data not shown). For all analyses, 'Below A Levels' was used as the baseline group for comparison. As noted earlier, for certain analyses in the 1958 cohort we included a category of 'dropouts', i.e. entry to HE but no qualification gained.

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Our analysis strategy had two parts: charting geographical mobility and estimating the benefits of HE.

Charting geographical mobility

2.4 In order to investigate graduates' geographical mobility we compared location at birth with location at ages 33 and 42 (1958 cohort) and at age 30 (1970 cohort) for all cohort members at different qualification levels. Net gains and losses in terms of percentage changes were assessed for the different qualification categories to determine which areas had gained graduates relative to other areas and which areas had lost them. The analysis of the geographical base for the occupations graduates entered followed the same approach. All but a handful of graduates had entered professional, intermediate/managerial or skilled occupations. Accordingly, for just these three categories we calculated the percentage gain in each region at the time of the survey compared with the location at birth.

Estimating the benefits

2.5 Benefits are defined in terms of the marginal increases for a given outcome across the different qualifications levels. An HE benefit at the two levels (degree/non-degree) therefore represents a statistically significant increase in the outcome for HE qualifications compared with A Levels. Qualifications below A Level serve as a baseline giving the size of the outcome (mean value or percent prevalence) for this group.

2.6 We first examined the 'raw' set of differences, in terms of marginal increases, in the benefits identified with the different outcomes across the different qualification levels. In line with much of the literature in this area, we refer to the set of differences as a 'gradient', though we recognise that there is not necessarily any continuity from one qualification level to another and that many relationships between qualification levels and other variables will be non-linear.

2.7 Secondly, by means of multivariate statistical analysis, we re-estimate the marginal effects taking account of three types of early influences: family background, including parents' social class and education and interest in the cohort members' education (as reported by teachers); material circumstances including housing tenure, overcrowding and a poverty indicator (free school meals); and early educational attainment as assessed by school tests. Wherever possible we also include as controls earlier measures of the outcome taken prior to entry into HE, such as teenage smoking behaviour and health status, for example, in the analyses of health benefits. Such controls help to correct the 'selection biases', i.e. we want to be sure that any differences we observe between graduates and others in relation to an outcome are not attributable to

another early life characteristic that distinguishes graduates from others. To determine whether an observed HE benefit varied depending on the type of secondary school attended, in further analysis we also re-run the analyses for the four types of school that cohort members had attended: independent, grammar, comprehensive and secondary modern. We also investigate whether the HE effects differed for people growing up in families where the father was in a manual as opposed to a non-manual occupation, and whether they differed between men and women. Again to determine whether the benefit resided in the post HE occupational experience rather than the HE experience itself, for certain analyses we also take type of occupation at the time of the most recent survey into account. Table 2.2 shows the standard set of controls that were used in the analysis. Additional controls were used for particular analyses as appropriate. These are specified at the appropriate place in the text.

2.8 Appendix 2 gives an overview of the statistical methodology involved and Appendix 3 gives the details of the measurement of the outcome variables. Broadly, for outcome variables that are binary in form, i.e. have two values expressing presence or absence of an attribute, logistic regression is used to estimate the effect of qualification level on the *probability* of the outcome occurring. For variables that can be considered continuous in form, Ordinary Least Squares (OLS) regression is used to estimate the effect of qualification level on the *mean score* of the outcome variable. Where differences between HE and lower qualification levels are cited, they are always statistically significant at the 0.05 level or better, i.e. the odds are less than one in twenty that the difference could have arisen by chance.

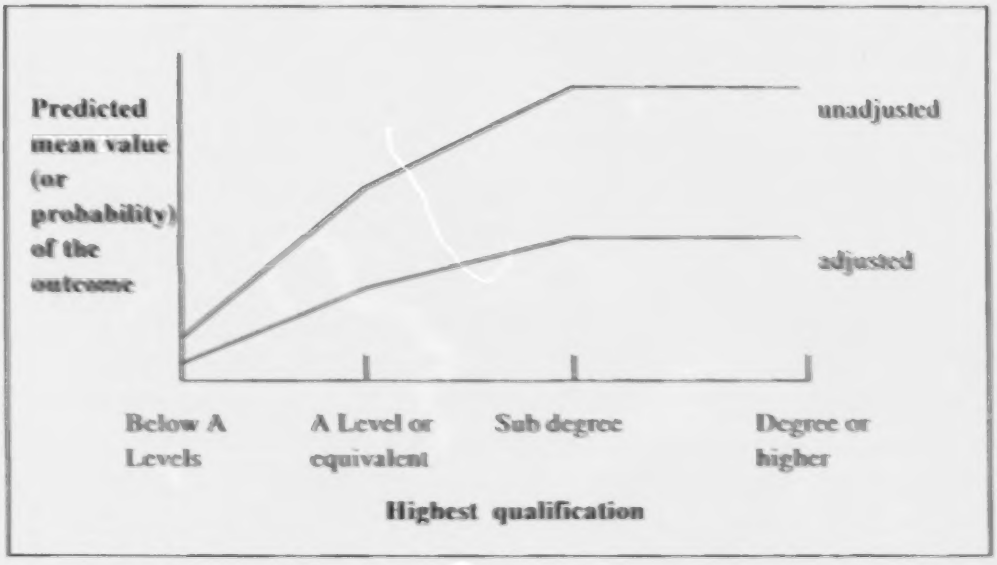
2.9 The adjusted gradients, comprising the marginal effects between qualification levels plotted across the qualification categories, taking account of all the different controls, are the principal focus of our interest (Figure 2.1). In summary they tell us the extent to which the 'higher education effect' is sustained in the face of other potentially competing influences with which it could be confounded. Generally, we restrict presentation to the adjusted gradients comparing these across cohorts and across ages (1958 cohort).

Table 2.2: Principal control variables

Social Class at Birth: measured by the father's occupation or the mother's occupational class if the father was absent.
Mother's education: measured by whether she completed school before of at 15 compared to after the age of 15.
Parental Interest in child's education: coded into two groups, those who had one parent who was reportedly 'very interested' compared to all other categories (at the age 10/11).
Free school meals: whether the child received free school meals at the age of 10/11.
Crowding: whether or not the child lived in a house with more or less than 1.5 people per room (crowded/not crowded) at the age of 10/11.
Cognitive Skill: reading and maths scores at the age of 10/11 were used in their continuous forms as controls.
Ethnicity: grouped into 'white' and 'other'.
Health Abnormality: dummy variable indicating one or more health abnormality at the age of 10/11.

Additional Stratifying Controls
Type of school attended: independent, grammar, comprehensive, secondary modern.
Family social class: manual, non-manual.
Gender: men, women.

Figure 2.1: Method for displaying results



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3. Geographical mobility of graduates

3.1 As noted in the previous section, in each follow-up survey of the 1970 cohort and 1958 cohort, the place of residence of the cohort member was recorded. For both cohorts we use the post-1974 ten standard region boundaries of Great Britain to analyse the movement of the cohort members from the time of their birth to the time of the most recent surveys. We examine how this movement is differentiated between individuals with different qualifications and occupations.

a) Overall migration by standard region

3.2 Figure 3.1 displays the distribution of 1970 cohort graduates at birth and at age 30 over the ten standard regions of Britain. Such regions are fairly large and hence the movements presented in this section of the report will reflect, for the most part, reasonably long-distance moves. Figure 3.2 displays the same information for the 1958 cohort at birth and at ages 33 and 42. Both figures include *only* those cohort members present in the study at all relevant ages and thus represent the migration behaviour of the same group of people over a 42 or 30-year period.

Figure 3.1: *Percentage of graduates in the 1970 cohort living in each region at birth and at 30 years of age*

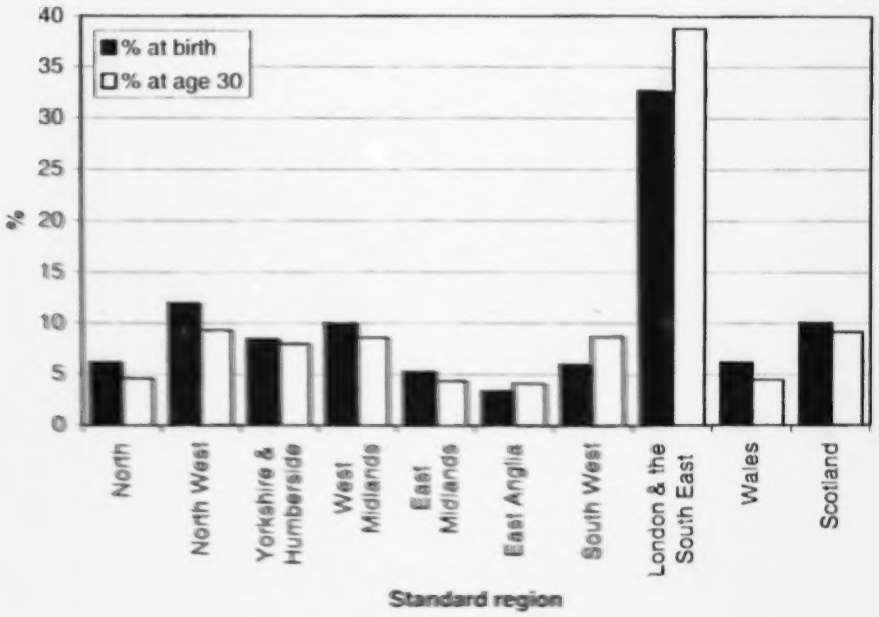

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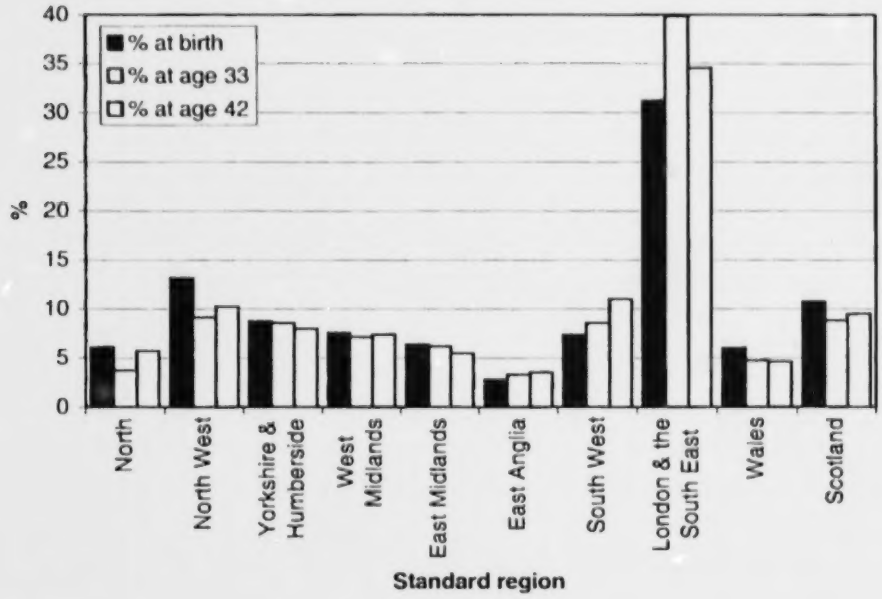
Figure 3.2: Percentage of graduates in the 1958 cohort living in each region at birth, 33 and 42 years of age



3.3 Both sets of distributions of graduates reflect the national population densities of Britain, as both studies were fully representative of the British population at time of birth, although there may have been some differential attrition by region over time. Graduates were most highly concentrated in London and the South East with small numbers being found in Wales, East Anglia and the North. Migration of the cohort members has resulted in modest population decline in the North, North West, the two Midlands regions, Wales and Scotland for both cohorts. Correspondingly, the number found in East Anglia, the South West, and London and the South East had increased over time. This is true for both cohorts from birth to their early thirties, and in all but one instance for the 1958 cohort into the early forties. The one exception is for London and the South East: fewer graduates live in this area at age 42 compared to age 33. This suggests some reverse migration out of the capital in middle age.

b) Differential migration patterns by qualification level

3.4 In order to establish the differential movement of cohort members by their highest qualification, we display the net change in the percentage of individuals for each qualification category found in four selected standard regions. When the cohorts are broken down by standard region at birth, the

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percentage that had attained a degree level qualification by their early thirties was similar in each area of the country. In the 1970 cohort this was between 17% and 23% of individuals born in each region attaining degrees by age 30. The equivalent range at birth for degree level qualifications obtained by age 33 in the 1958 cohort was 10% to 14%. When the same individuals are divided by region of residence at ages 30 and 33, much greater variability is observed: in the more recent cohort between 15% and 26%, and in the later cohort between 9% and 17% of graduates, are found across the standard regions. Figures 3.3, 3.4 and 3.5 show for the 1970 cohort and for the 1958 cohort at ages 33 and 42 respectively, the difference between these statistics for each region. These give the net percentage changes at each qualification level.

Figure 3.3: *1970 cohort: The net percentage change of individuals in each qualification category between birth and 30 years of age by standard region*

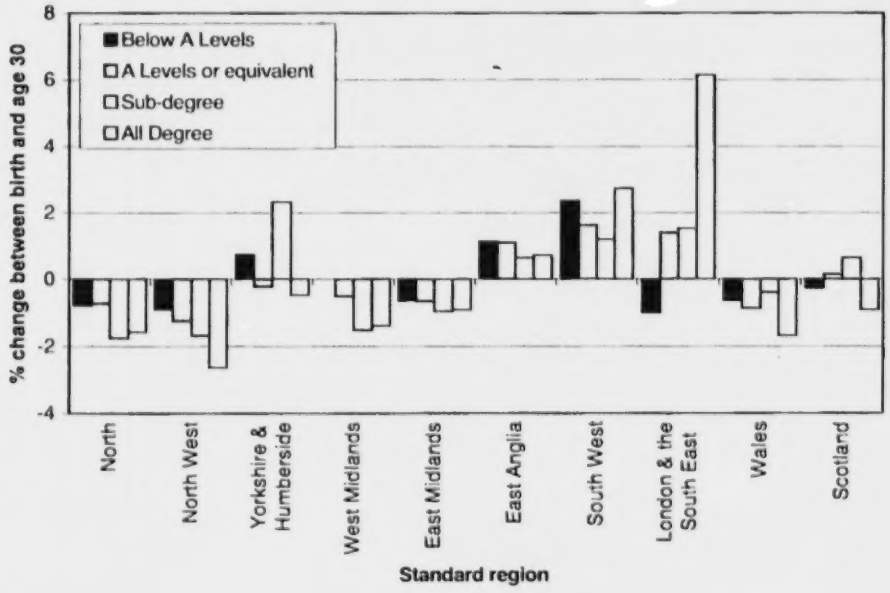

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***Figure 3.4**: The net percentage change of individuals in each qualification category between birth and 33 years of age by standard region*

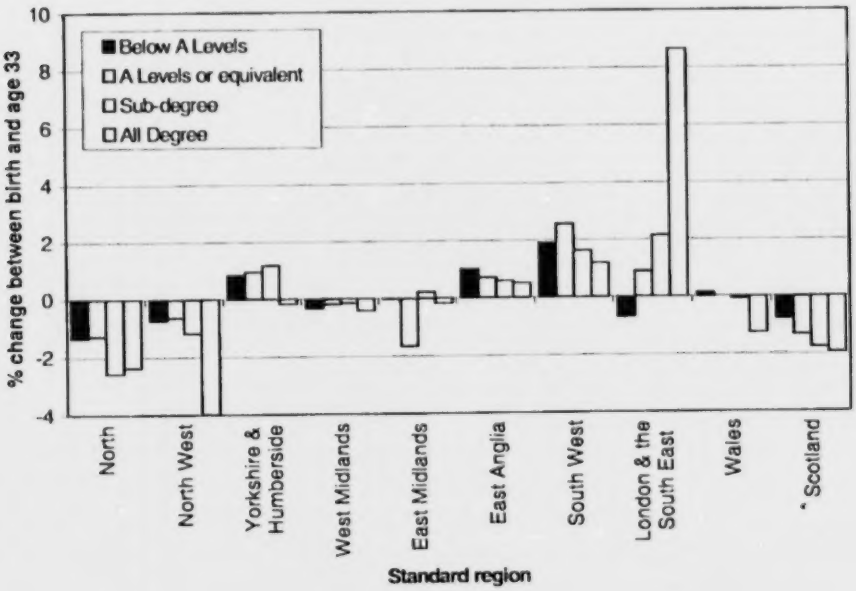
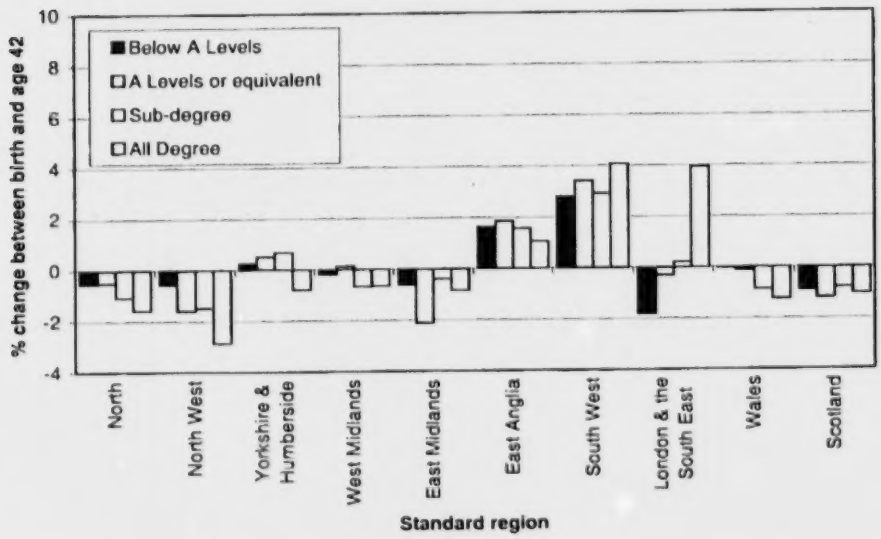


***Figure 3.5**: The net percentage change of individuals in each qualification category between birth and 42 years of age by standard region*



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3.5 Figures 3.3 to 3.5 show population movement away from the North and North West and to the South. The mobility is also qualification dependent, with a greater proportion of highly qualified people moving out of the North and into the South compared to those with low qualifications. In the case of the North and North West, population is being lost in every qualification group. For the South West, population gains are being made in every qualification group. London and the South East are distinct because although experiencing overall population growth, real losses (as opposed to relative losses) of unqualified people are also apparent. Thus, there is a net percentage loss of individuals with below A Level qualifications. In the other regions similar mobility processes are also at work, with population loss being greatest among the most qualified in Scotland, Wales and the West Midlands (1970 cohort).

3.6 Comparing the 1958 and 1970 cohorts (Figures 3.3 and 3.4), net change in qualification specific population movement is greatest among graduates in the 1958 cohort between birth and age 33. This may in part be due to the different time intervals involved (the 1958 cohort were three years older at the time of the early thirties survey). However, the bulk of the difference is more likely to be due to the changing nature of graduates themselves over this time period. Due to the expansion of university intake between 1976 and 1988, the number of individuals possessing degrees by their early thirties had increased markedly – by 7% – between the cohorts. Consequently, we may be observing the results of a temporary 'over-supply' of graduates with a relative reduction in the jobs available to them and consequently a reduced incentive to move.

3.7 Second, we compare the temporal and age differences observed for the 1958 cohort at age 33 and age 42. Comparing Figures 3.4 and 3.3, we observe less overall migration at age 42 than was evident at age 33 in the North, North West and London and the South East. The exception is the 'Below A Levels' qualification group in London and the South East. In the South West more movement across all qualification levels is apparent compared to age 33.

3.8 There are several potential factors that may account for these patterns. The increased age of the cohort members may have led to reverse-migration back to the place of origin for housing or family purposes. This would have been aided by the greater human capital gained at age 42 compared to age 33, through employment experience and, perhaps, education, which offered more flexibility in location. Another potentially important factor is the nature of economic change between 1991 and 2000, particularly in the housing market of London and the South East, where increasing relative prices may have encouraged the out-migration of individuals who moved into these areas in the earlier stages of their careers. The greater number of people found in the South West, and decreased migration in other regions at age 42, may be a manifestation of the movement back to place of origin and out of the capital toward other southern locations. The increase in the net loss of unqualified individuals from London between ages 33 and 42 is also important to note as it

implies that the opportunities afforded to the poorly qualified were pushing them away from the capital with increasing, rather than decreasing force, as they grew older.

c) Regional migration of graduates by occupation

3.9 What sort of jobs do graduates end up in? Are there differentials with regard to type of occupation as well as qualification? To answer these questions the same style of migration analysis was carried out on the occupational social class (Registrar General Social Class 1991) of the cohort members for those individuals who had obtained a degree level qualification. We limit the analysis of occupations to three RG classes: I (professional), II (intermediate) and III (skilled non-manual). There were too few cases in the other classes for meaningful analysis. Figures 3.6 to 3.8 show the comparisons across regions

Figure 3.6: *1970 cohort: The net percentage change of graduates in each of the first three Socio-Economic Status (SES) categories between birth and 30 years of age by standard region*

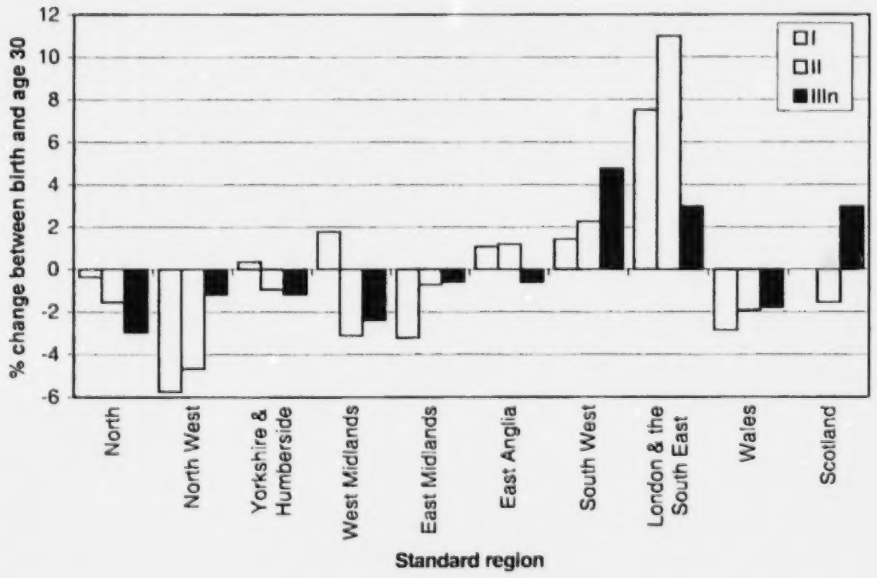

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Figure 3.7: *The net percentage change of individuals in each of the first three SES categories between birth and 33 years of age by standard region*

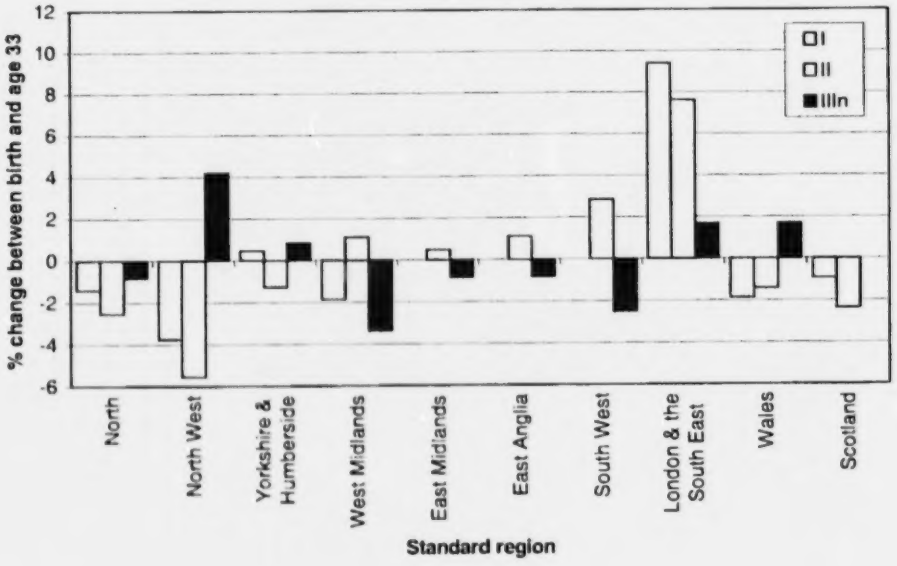
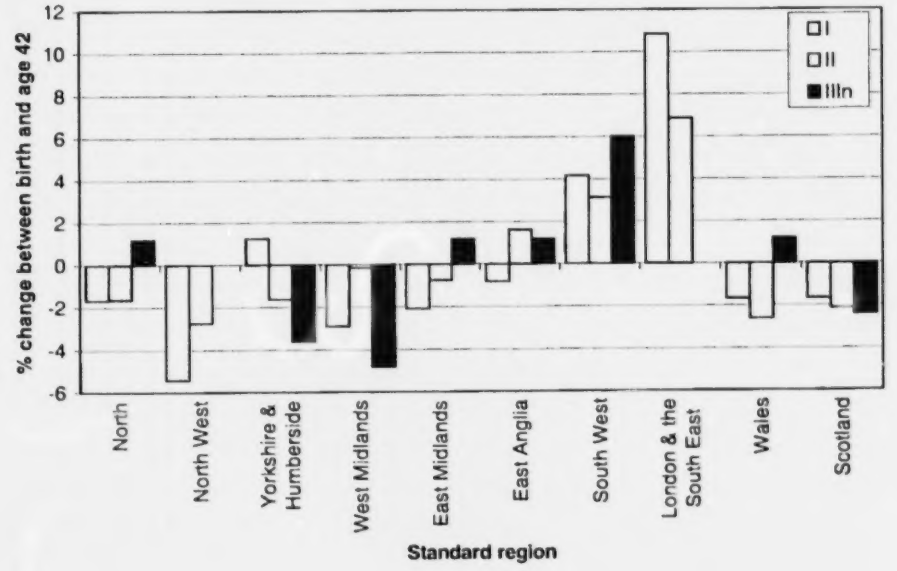


Figure 3.8: *The net percentage change of individuals in each of the first three SES categories between birth and 42 years of age by standard region*



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3.10 These graphs show that, even within the net gain or net loss of HE individuals, in any one region the migration movements of the cohort members are further differentiated by the type of job they have. Comparing first the 1970 cohort at age 30 and the 1958 cohort at age 33, it is evident that London and the South East not only gained the most graduates (Figures 3.3 and 3.4), but that a high percentage of them worked in professional and intermediate occupations (I and II) at the time of the survey (Figures 3.6 and 3.7). This is in contrast to the South West, which also had a net gain of graduates – but for the 1970 cohort mainly, in skilled non-manual jobs rather than professional or intermediate occupations. Intermediate employed individuals dominate the gain in graduates for the South West in the 1958 cohort at age 33 – again the professional jobs do not feature as much as they do for the South East migration 'hub'.

3.11 The corresponding pattern of out-migration from the Northern regions is also notable from these figures, particularly for the North West. Here, movement was greatest for those graduates in the top occupational classes. For the 1958 cohort at age 33, the overall out-migration of graduates actually comprised out-migration of those in social classes I and II combined with a *net gain* of individuals working in occupations defined as III (non-manual). Looking at the 1958 cohort as they passed from age 33 to age 42 (Figures 3.7 and 3.8), the patterns become, if anything, more polarised, with increasing percentages of professional individuals leaving the northern regions and moving to the south.

4. Health benefits

4.1 In this section we present the first of our analyses of benefits – those relating to mental and physical health and health behaviour. The outcome measures – all of which showed statistically significant HE effects – included a measure of depression as obtained from the score on the Malaise Inventory, self-reported general health status, and a measure of physical state – Body Mass Index. We also analysed one health behaviour outcome in some detail – smoking. As noted in Section 2, a number of other health outcomes were also examined but were found to have a weak or non-significant relationship with higher education status and are not reported.

a) Malaise Inventory

4.2 In both the 1970 and the 1958 cohort studies (at ages 33 and 42), the Malaise Inventory was used to assess tendency to depression in the cohort members. Here we analyse the effects of HE on depression score, as measured by the number of endorsements of symptoms specified in the Malaise Inventory (out of 24) using OLS regression. In each regression a 'raw' and 'adjusted' model was estimated. The adjusted model included the standard control variables (Table 2.2). In addition, a measure of depression in adolescence was included in order to take account of variability in psychological state prior to entry to further or higher education. For the 1970 cohort this was their Malaise score at age 16. For the 1958 cohort, because no adolescent malaise scale was available, the Bristol Social Adjustment Guide (BSAG) 'Depression Item' scale was used.

4.3 Figures 4.1 and 4.2 show the adjusted Malaise scores of the two cohorts in their early thirties at each qualification level and at the two ages for the 1958 cohort. In both cohorts there was a (significant) general trend of lower psychological distress among the more qualified, with the estimated (predicted) Malaise score for graduates being 0.6 points and 0.8 points below that of people with 'Below A Level' qualifications in the 1970 cohort and 1958 cohort respectively, and 0.3 points in both cohorts for people with A Levels.

4.4 The overall level of depression increased both between the cohorts and between the two 1958 cohort age groups, as is shown by the difference in the baselines (below A Levels) on the left-hand axes of Figures 4.1 and 4.2. This points to an overall rise in depression between the 1991 and 2000 surveys, a 'period effect' that has been noted elsewhere (Fornbonne, 1999, Bynner et al, 2002).

4.5 The fact that the lines are parallel in Figures 4.1 and 4.2 (more so between cohorts than between ages) indicates that the effect of education on depression

in the early thirties has not changed significantly in the twelve years separating these two cohorts or with age in the 1958 cohort. This result was equally true for men and women, though women had the overall higher depression scores.

Figure 4.1: *Adjusted depression score by cohort*

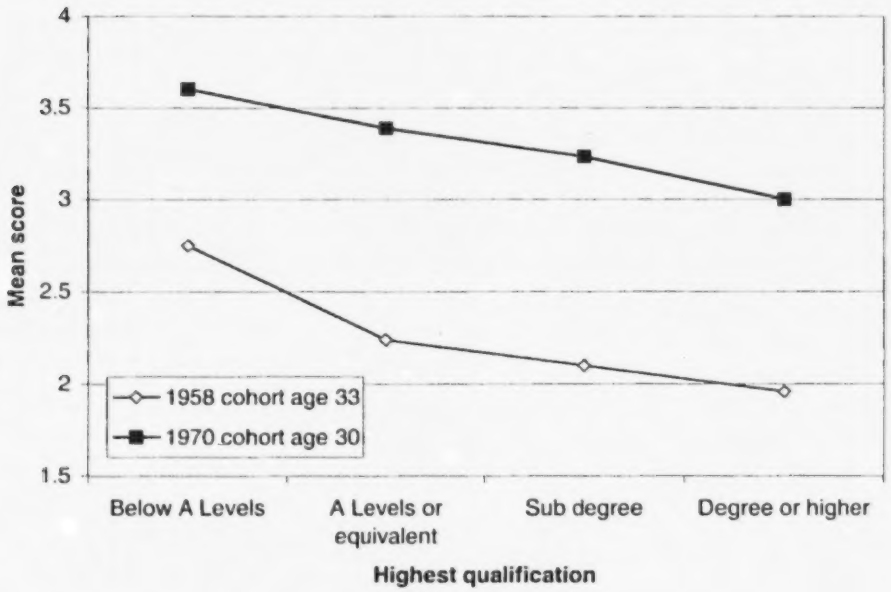
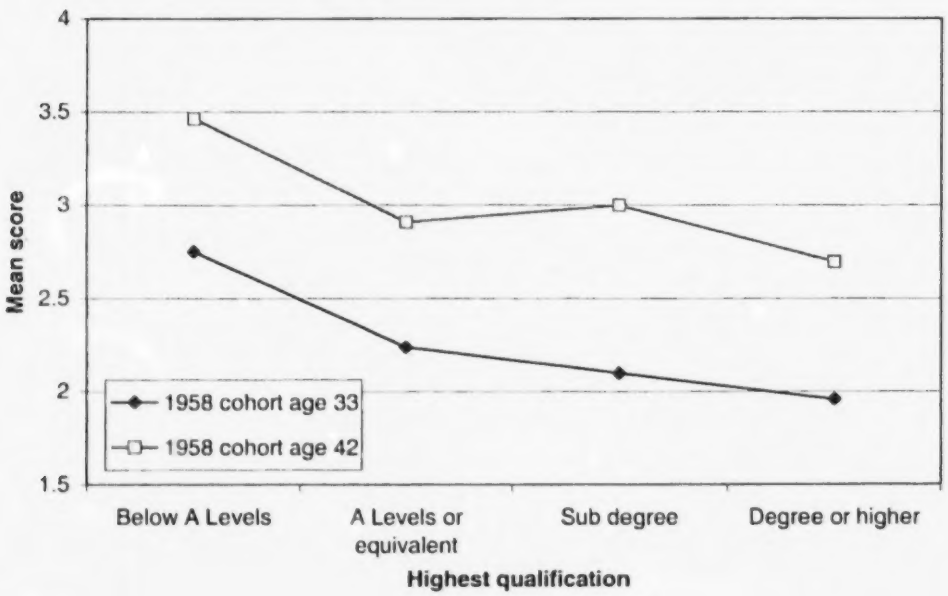


Figure 4.2: *Adjusted depression score in the 1958 cohort by age group*



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4.6 Depression scores were also analysed by social class (manual vs. non-manual) and, for the 1958 cohort, by the type of school attended at age 16. Both variables related modestly to depression. But when the regression analysis was carried out separately within each of the subgroups defined by them, the HE effects remained largely unaffected.

4.7 We can therefore conclude that despite the rise in depression between the cohorts and across age groups, and apart from some variations with gender, social class and type of school attended, the basic protective influence of HE against depression remains largely the same.

b) Self-reported general health

4.8 At each age the cohort members were asked to report what they considered to be their general state of health on a continuous scale from 'poor' through to 'fair' and from 'good' to 'excellent'. As for the Malaise scores, OLS regression was used to adjust the scores, taking account of early circumstances and achievement. Adjustment was also made for earlier mental health status as recorded at age 16. Figures 4.3 and 4.4 compare the HE effects on health status between cohorts and between ages. Figure 4.5 includes the HE dropout category.

Figure 4.3: *Adjusted general health score by cohort*

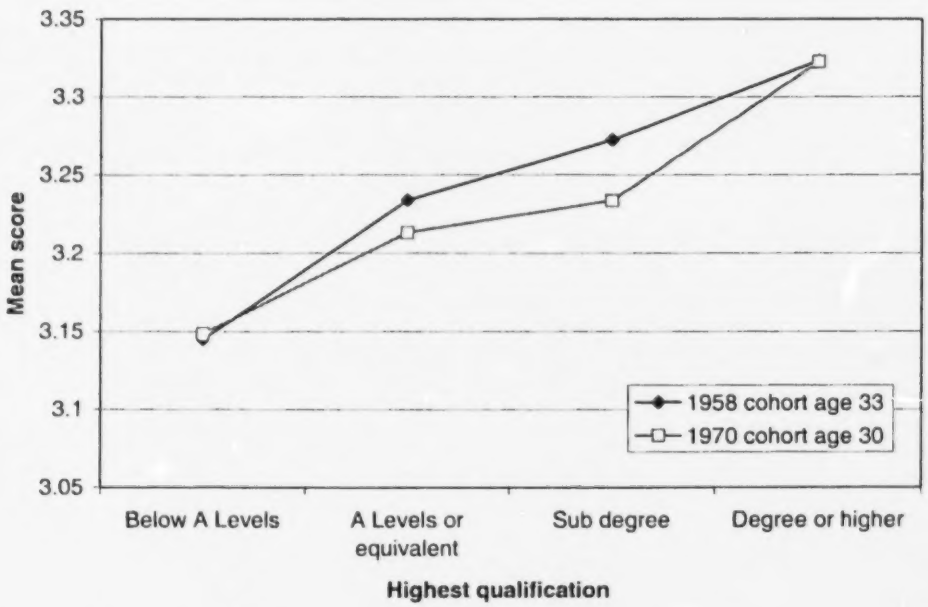

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Figure 4.4: Adjusted general health score in the 1958 cohort by age group

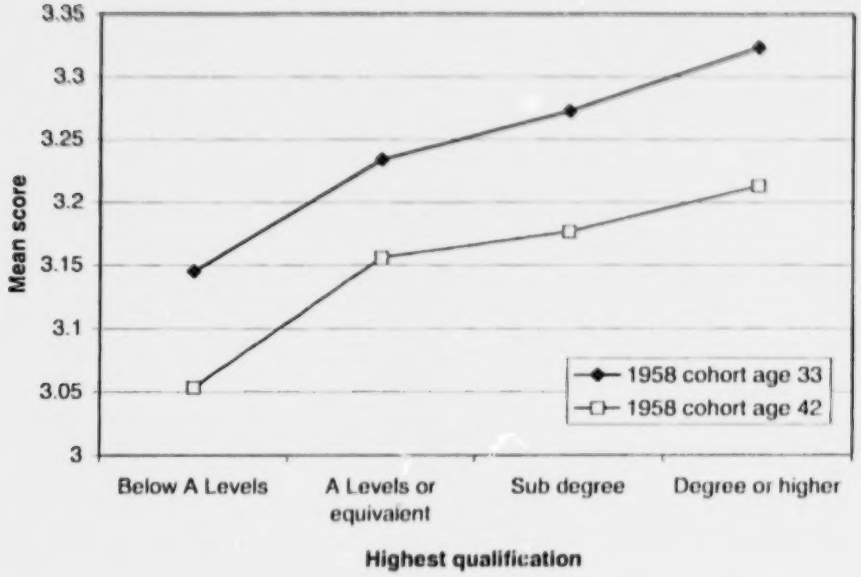
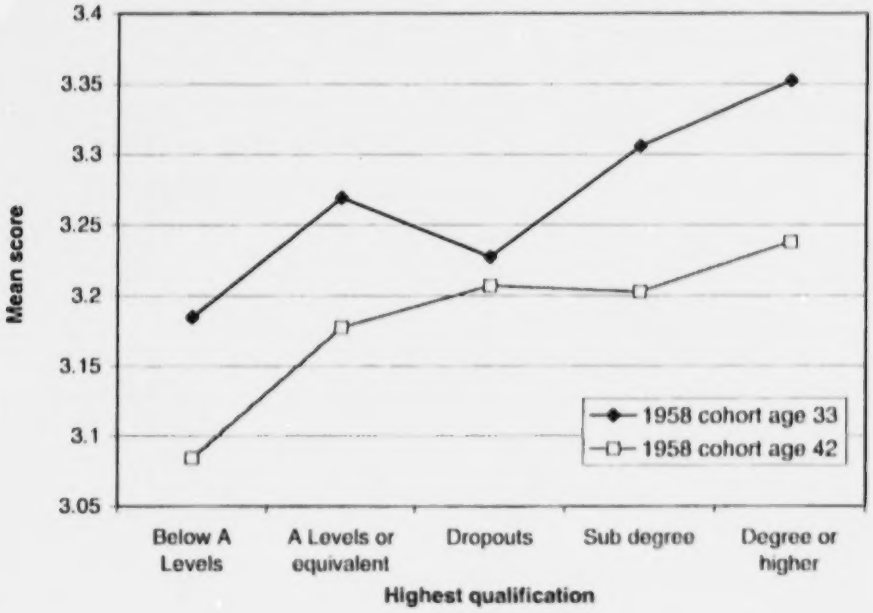


Figure 4.5: Adjusted general health score, including dropouts, by age group



4.9 As we might expect, in direct contrast to the decline in depression scores with qualification level, in all groups there was a consistent increase in predicted general health across qualification levels. For the cohorts in their thirties, the predicted values were similar to each other and the patterns produced almost

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directly comparable (Figure 4.3); although overall the 1958 cohort at age 33 reported significantly higher scores. For both cohorts the predicted scores for the HE categories were significantly higher than for 'A Levels'.

4.10 For the 1958 cohort there was a lower baseline for age 42 compared with age 33, i.e. a lower general health status with rising age was reported (Figure 4.4). However there was much the same pattern of increasingly good 'general health' with qualification level at both ages. There were no significant differences between the sexes on this measure, which considering its correlation with mental health measures is surprising.

4.11 Figure 4.5 shows that relatively poorer general health was evident among those who were non-completers at age 33, but the effect did not persist up to the age of 42 in the 1958 cohort (Figure 4.5). This suggests some diminishing of the effect of dropout with age.

4.12 Although those attending comprehensive or secondary modern schools reported better general health than those who went to grammar or independent schools at both ages 33 and 42, this relationship did not appear to moderate the HE effect. It was sustained at much the same level in each type of school, as it was for manual and for non-manual groups and for men as much as for women.

4.13 As noted in Section 2, analysis of the health data collected in the most recent survey, conducted during the course of this project, included specific medical conditions such as bronchitis, asthma, hypertension, stress related complaints and cancer. These did not reveal any statistically significant relationships with the highest qualification obtained. It is likely therefore that the increased probability of reporting 'excellent' general health is, at least in part, a reflection of general feelings of well-being and perhaps health related behaviour (see analyses below) as much as objective health status.

c) Body Mass Index (BMI)

4.14 To assess the degree of obesity among cohort members the BMI was calculated (weight in kg/height in m^2) and the effects of HE experience on BMI analysed using OLS regression. To take account of obesity level prior to further or higher education BMI measured at 16 years of age in each cohort was also included as a control. Figures 4.6, 4.7 and 4.8 give the adjusted relationships with qualification level.

Figure 4.6: Adjusted Body Mass Index by cohort

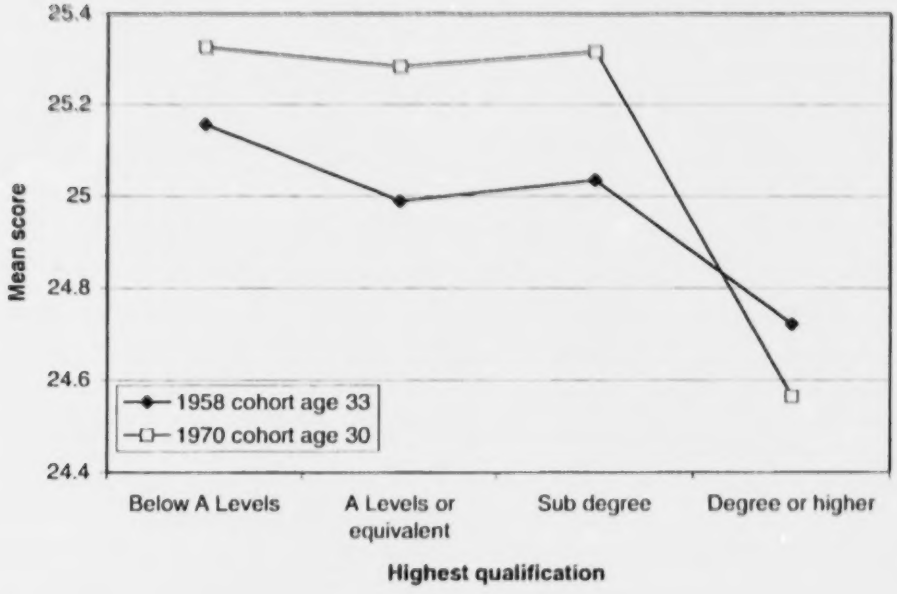


Figure 4.7: Adjusted Body Mass Index in the 1958 cohort by age group

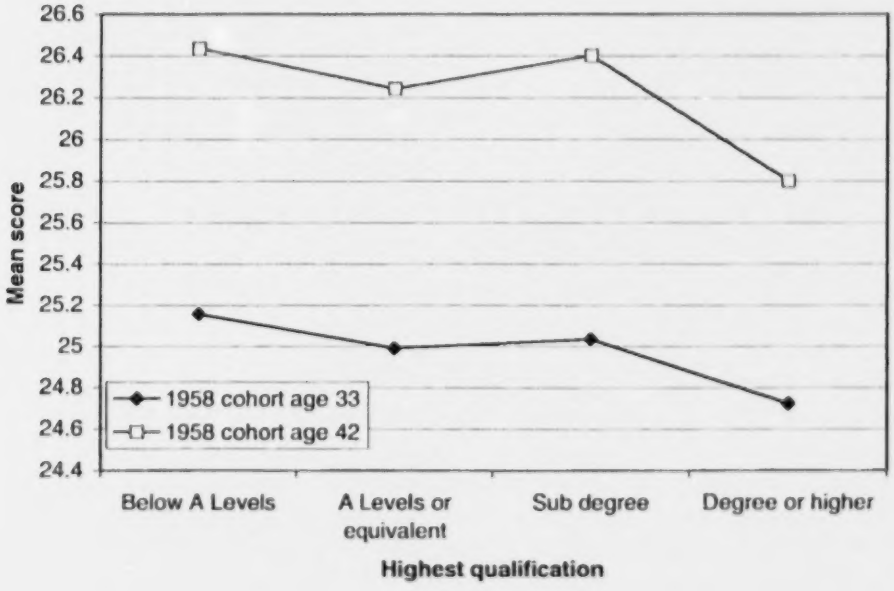
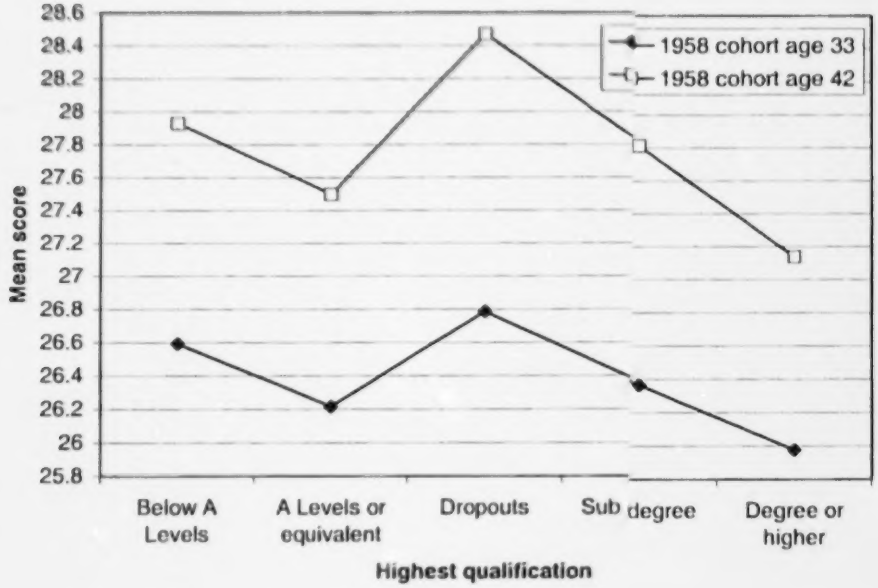


Figure 4.8: Adjusted dropouts' Body Mass Index, including dropouts, in the 1958 cohort by age group



4.15 BMI displays a more direct *degree-related* benefit than many of the other outcomes examined in this report. For both cohorts in their early thirties those with 'degree level' qualifications had, on average, a demonstrably lower predicted Body Mass Index whilst the differences between the remaining three groups were much less and non-significant, particularly for the 1958 cohort at age 33 (Figure 4.6) and similarly at age 42 (Figure 4.7). The overall predicted BMI score was highest for those in the 1958 cohort at age 42 – most probably the result of age on individual weight. The overall HE effect on BMI in the early thirties was strongest for the 1970 cohort. The biggest difference however, was between dropouts and those who had completed HE (Figure 4.8). The 'dropouts' had the highest BMI scores of any group, showing a one-point difference with those with degrees in the 1958 cohort at age 33 and 0.8 at age 42. No gender difference, or significant variability across social classes or type of school attended, was found at any of the three ages examined.

d) Smoking habits

4.16 The 1958 cohort at age 33 had the highest percentage of smokers of either cohort at any age with 33% of people reporting smoking cigarettes daily. The equivalent figure in the 1970 cohort at age 30 was 29%. For the 1958 cohort at age 42 the proportion of the sample reporting daily smoking was smaller: 26%. These patterns reflect the overall decrease in smoking prevalence over the last ten years. The number of cigarettes smoked also varied. At age 33 the

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mean number of cigarettes smoked per day by smokers in the 1958 cohort was 17.3 whilst at 42 it was 17.5. Thus, although there were fewer smokers in the 1958 cohort at the older age, those who had not 'kicked the habit' were smoking, on average, more than they had been at age 33. For the 1970 cohort at age 30 the mean number of cigarettes smoked was much lower, 14.6 per day.

4.17 Thus, in their early thirties the younger cohort had fewer smokers smoking fewer cigarettes than the older cohort. As they got older, the 1958 cohort were less likely to smoke but those who did smoke smoked more.

4.18 With these changes in mind what were the effects of HE on smoking behaviour: including whether the cohort member smoked and the number of cigarettes smoked? In the former case we used logistic regression to estimate the probability of becoming a smoker across the different qualification levels. In the case of amount smoked, OLS regression was used to estimate the predicted number of cigarettes smoked at the different qualification levels. Apart from the standard set of controls, to take account of earlier smoking, self-reported smoking behaviour at 16 was also included. Figures 4.9, 4.10 and 4.11 give the adjusted differences between qualification levels and Figure 4.12 shows the comparison across qualification levels for different types of school attended (1958 cohort at 33).

Figure 4.9: *Adjusted probability of smoking by cohort*

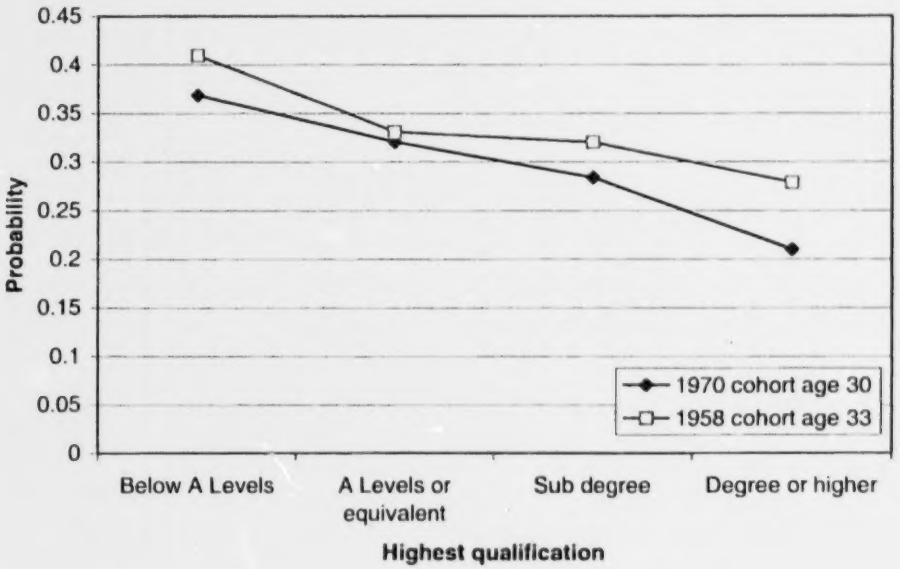

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Figure 4.10: *Adjusted probability of smoking in the 1958 cohort by age group*

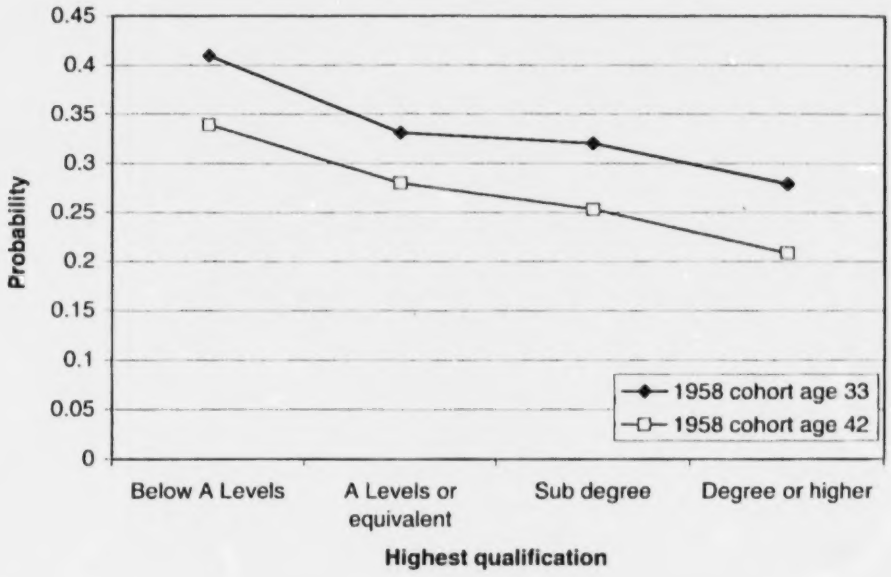

Figure 4.11: *Adjusted probability of smoking, including dropouts, in the 1958 cohort by age group*

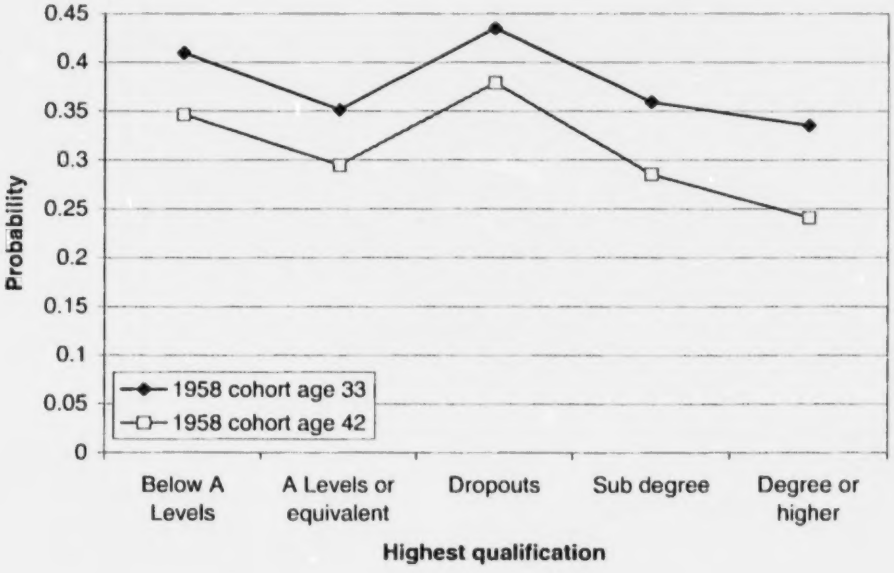

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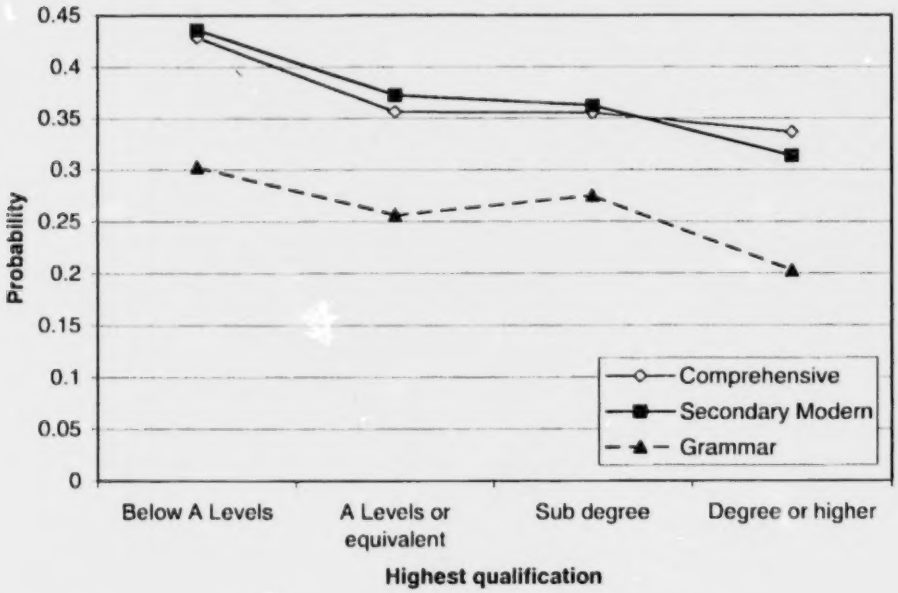
Figure 4.12: *Adjusted probability of smoking in the 1958 cohort by school type at* age *33*



4.19 The probability of being a smoker decreased with qualification level, for both men and women with, if anything, an increase in the strength of the effect from the earlier to the more recent cohort and with age (Figures 4.9 and 4.10). The gradient for the 1970 cohort was steeper than for the 1958 cohort, pointing to strengthening of the effect for the younger cohort (Figure 4.9). For the 1958 cohort, the probability of smoking decreased across all four qualification levels between the ages of 33 and 42, with those in the HE categories the most likely to have given up (Figure 4.10). Notably, dropouts were the least likely of all qualification groups to have given up, with the difference sustained at both age 33 and age 42 (Figure 4.11).

4.20 Repeating the analysis across different types of school attended showed much the same patterns. However, there was a generally lower smoking level among cohort members who had attended grammar or independent schools (Figure 4.12). This points to a kind of suppressor effect in relation to smoking for the latter types of school, but over and above this, HE suppresses the tendency to smoke even further.

4.21 Did these kinds of effects extend to the amount smoked? There was a declining gradient in the amount smoked across the qualification levels but when the controls were included this disappeared at age 42 in the 1958 cohort (Figure 4.14). Though still statistically significant, this effect was also much reduced for the 30 year-olds in the 1970 cohort and the 33 year-olds in the

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1958 cohort (Figure 4.13). Again, those identified as HE non-completers smoked more cigarettes than any other group even when the controls were applied. Overall, the results suggest that factors other than qualification levels were more important influences on the amount smoked, especially at the older ages. Qualification level exercised its main impact on whether the respondent smoked or not.

Figure 4.13: *Adjusted amount smoked (among smokers only) by cohort (controlling for previous smoking)*

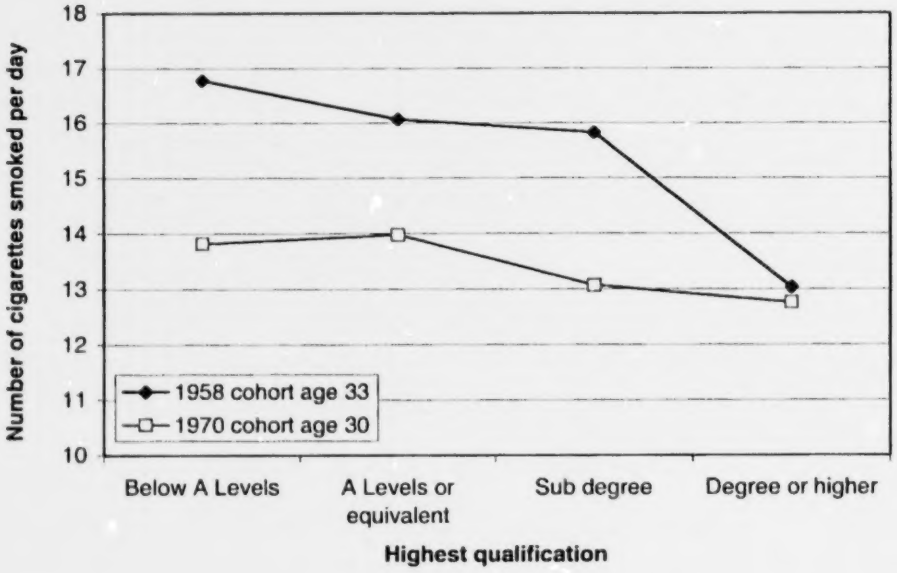

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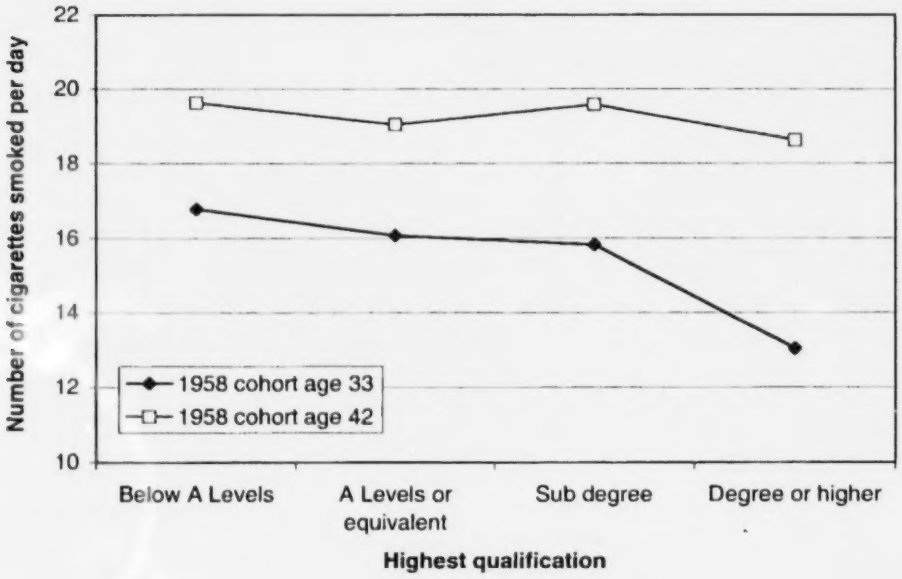
Figure 4.14: *Adjusted amount smoked (among smokers only) in the 1958 cohort by age group (controlling for previous smoking)*



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5. Labour market outcomes

5.1 The labour market benefits of higher education are well established in terms of earnings and attractiveness of job applicants to employers, particularly for certain kinds of 'graduate jobs'. Less well established are the related benefits of protection against unemployment, the boost offered by higher education to social mobility and the skills return from higher education experience. A commonly held view is that with the expansion of higher education, these benefits will reduce. The more graduates there are, the more any benefits accruing to HE will spread among them at a lower level due to the 'ceiling effect'. The average return to HE might therefore be expected to decline. The alternative view is that the economy expands to accommodate graduates; the more graduates there are, the more high level jobs are created. What is the evidence?

a) Protection against unemployment

5.2 The surveys carried out in 2000 included self-reported retrospective employment histories that enabled the complete occupational record to be constructed back to 16 on a month-by-month basis. Each month recorded the labour force status of all sample members. In order to reveal cohort differences in the effects of higher education as a protection against unemployment, we concentrate on a comparison of unemployment probabilities between the ages of 25 and 30.

5.3 There is considerable movement in labour market history during the period after school or university and although this is an interesting phenomenon in itself, it distracts from the primary question being addressed here, which is whether or not HE makes a difference to the probability of experiencing unemployment during adult life. Accordingly, we investigate the period between ages 25 and 30. The lower cut-off at 25 was chosen because this limits the possibility of exaggerating the effects of periods of temporary unemployment during transition out of education. Graduates increasingly tend to experiment with a number of employment options before settling into a more conventional continuing career. This period is also often interspersed with unemployment or extended holidays, so can tend to give a misleading picture of graduates' employment careers. Figures 5.1 and 5.2 give respectively for men and women in the two cohorts, and for the two ages, the probability of having experienced any spell of unemployment over the period age 25 to 30 at each qualification level. It can be seen that unemployment risk was higher in the 1958 cohort, i.e. higher in the period 1983 to 1998 than for the 1970 cohort in the period 1995 to 2000. This reflects changing economic circumstances between the two periods.

Figure 5.1: *Adjusted probability of experiencing unemployment between the ages of 25 and 30 years, men*

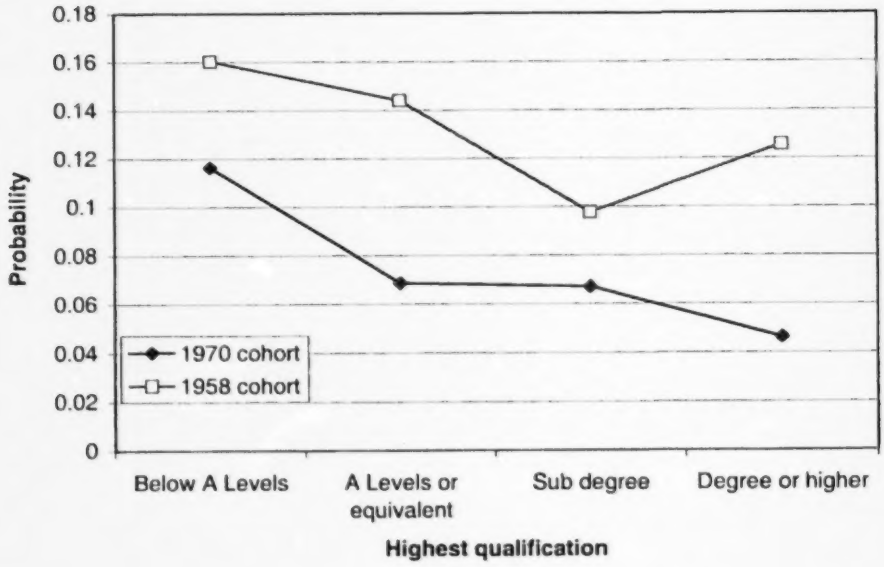
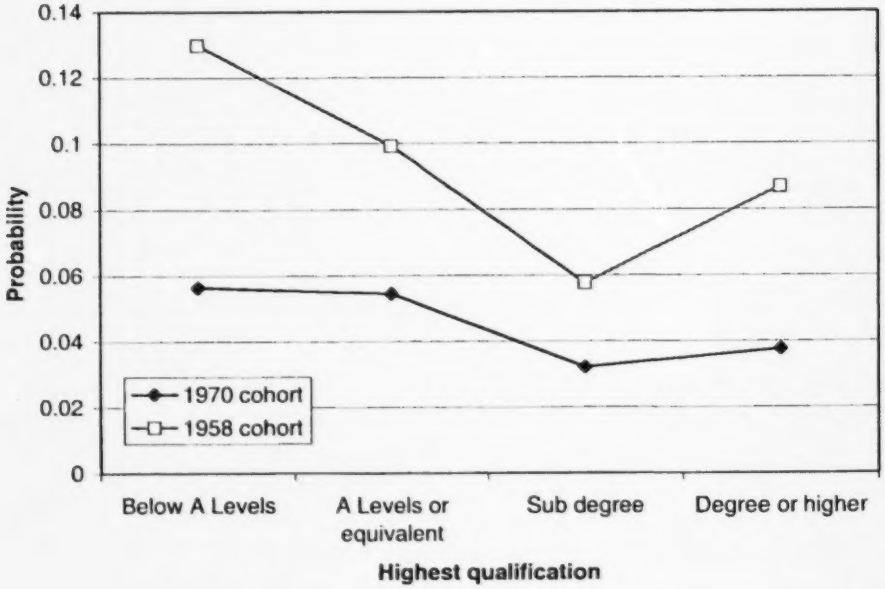


Figure 5.2: *Adjusted probability of experiencing unemployment between the ages of 25 and 30 years, women*



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5.4 For both men and women in both cohorts, the estimated probabilities of unemployment were significantly lower for those with degrees or sub-degree level HE qualifications than for those with other qualifications including A Levels or lower. As the analysis controls for family background and prior achievement and covers unemployment risk during a relatively stable market history, we can conclude that HE does supply a direct benefit in terms of protection against the risk of adult unemployment.

5.5 For men, the relative risk was much greater for the 1970 cohort than for the 1958 cohort; 12% of 1970 cohort men without A Levels experienced unemployment in this period compared to 5% of those with degrees, i.e. 60% lower. The comparable effect for the 1958 cohort was 33%. For women, there was no such cohort difference, i.e. the protection against the risk of unemployment was the same for both sexes.

b) Social mobility effects of degrees

5.6 Figures 5.3 and 5.4 show the effect of higher education on the probability of being in a high occupational category, social class 1 or 2, in adulthood, taking account of the childhood background and achievement variables. The different effects were estimated for adults born into different social classes. It can be seen from Figure 5.3, that the effect of gaining a degree for those born into low social class backgrounds is higher than that for those born into high social class backgrounds in both cohorts, with a larger impact for women. The effect is also larger for the 1958 cohort than the 1970 cohort. In other words, as we might expect, the benefit to social mobility is greatest for those who have the most to make up.

5.7 We can conclude that having a degree appears to be a better discriminator between individuals in the 1958 cohort than in the 1970 cohort, presumably because fewer individuals in the 1958 cohort had degrees (13% in the 1958 cohort as opposed to 20% in the 1970 cohort). Moreover, the difference between high and low social class groups is broadly the same in the two cohorts. The degree effect is slightly, but not greatly, stronger for low social class men and women than for higher social class men and women. Overall, these figures point to a possible decline in the social mobility benefit as a consequence of the greater expansion of higher education. There is a clear tendency for general movement up the social class scale and therefore there is a diminishing return in gaining higher education in relation to it. However, the social mobility gain remains substantial.

5.8 Figure 5.4 presents the difference in social mobility effects for the 1958 cohort between ages 33 and 42. The pattern of degrees by social class at birth does not change. Those from the lower social classes were gaining the main social mobility benefit and women more than men. We find, however, that the degree advantage declines with age. In other words, the older the graduate cohort

member was, the less likely they were to show relative movement up the social class scale. This represents another 'ceiling effect'. In the 1958 cohort as a whole, the proportion of those in high social class occupations rose from 40% to 47% for men and from 33% to 38% for women. Thus, promotion gives advantages to many individuals at this stage of the life course, helping to cancel out the specific benefits of HE. Since by age 42 high social class for those with degrees was already 88% for men at age 33 and 84% for women, the promotion trajectories of those with degrees were not well picked up by the social class variable and so the observed effect of having a degree declined.

Figure 5.3: *Adjusted effect of degrees on own social class, by social class at birth, 1970 cohort at 30 and 1958 cohort at age 33*

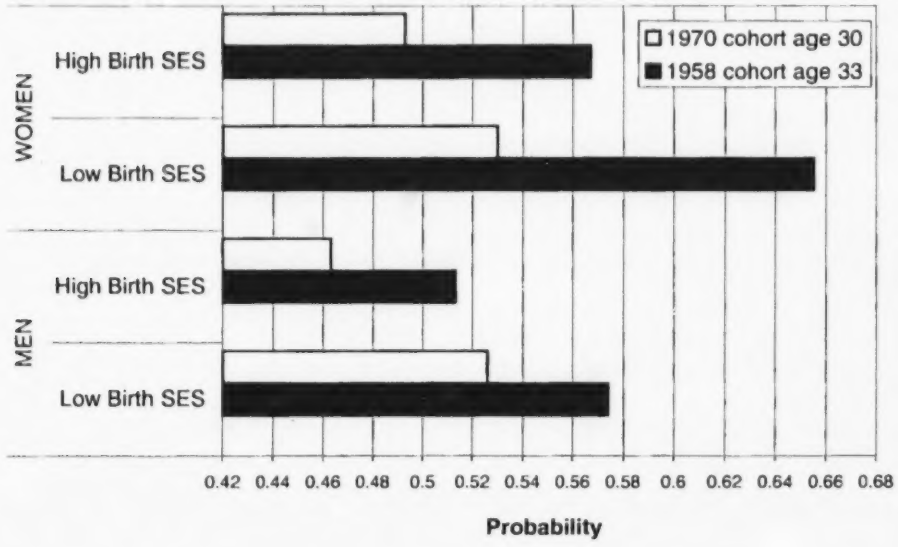

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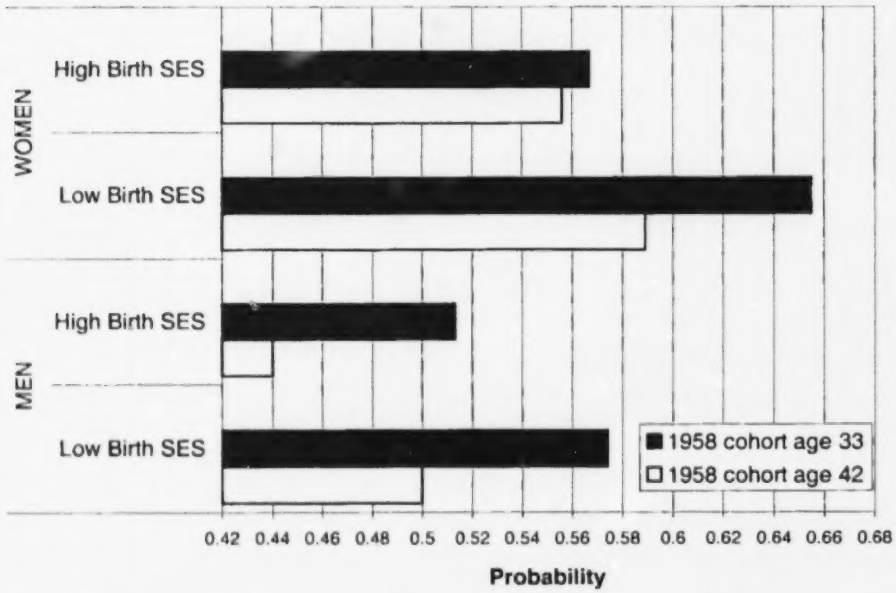
Figure 5.4: Adjusted effect of degrees on own social class, by social class at birth, 1958 cohort at ages 33 and 42



c) Skills acquisition[2]

5.9 Finally, we consider the effect of higher education on the acquisition of skills in general and particularly those to do with using computers at work. First, we define a multi-skilled person as someone possessing a number of skills relevant to modern employment. This provides us with a general measure of skill acquisition. Second, we focus on the use of computers at work. We use the survey data to investigate the extent to which graduates both exhibit more skills than those with lower qualifications and are more likely to use computers in the work they do. An additional question to consider is whether any observed skills benefits attributable to HE are more a product of the type of work entered or the HE experience itself. In the latter case we might expect the qualifications 'gradient' to disappear or be much reduced once current occupational status is taken into account. Logistic regression was used to estimate the marginal changes in the skills outcomes at different qualification levels.

Multi-skilling

5.10 The introduction to the questions about skills in the 2000 surveys asked 'for each skill, say whether you consider that your own ability is good/fair/poor/do not have this skill'. We take the answer category 'good' as indicating that the

[2] The reporting here draws on a much longer econometric appraisal of returns to computer use (Dolton and Makepeace, in press)

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person perceives himself or herself to have the skill. The particular skills considered here are:

- communicating with others;
- the use of numbers in calculations;
- the use of computers and information technology;
- working in a team;
- learning new skills;
- problem solving;
- using tools properly;
- looking after people who need care;
- working with finance and accounts.

5.11 Comparing these self-reported skills between the two cohorts, there was a degree of stability among some and some cohort shifts in others. Those that remained relatively stable were: communicating; numbers and calculations; working in a team; problem solving; using tools properly; looking after people and finance and accounts. The major shifts were in relation to the use of computers and information technology and learning new skills where substantially more 1970 cohort members reported these skills than their counterparts in the 1958 cohort. For comparisons with 33 year-olds in the 1958 cohort, we have to draw on a slightly different skills inventory leading to a subset of skills for comparison comprising:

- speaking clearly;
- carrying out mathematical calculations;
- using a computer to solve problems or give information;
- giving advice and support;
- using tools properly;
- looking after people;
- understanding finance and accounts.

5.12 In the case of the 2000 surveys, we define 'multi-skilled' as possessing five or more reported skills. In the case of the 1991 survey, we take the definition as three or more skills. On the basis of these definitions 49% of the 1958 cohort were multi-skilled at age 42 and 54% of the 1970 cohort at age 30 based on the 2000 surveys. Based on the 1991 survey, 46% of the 1958 cohort were multi-skilled at the age of 33.

5.13 Figure 5.5 shows the probability of being multi-skilled at different qualification levels for the 1970 cohort at age 30 and for the 1958 cohort at ages 33 and 42 taking account of earlier circumstances and experience, including the type of job entered. For both sexes there was a steady increase in being multi-skilled as the level of education increased, with a particular boost evident for experience of HE. Thus, the probability of someone with a degree

being multi-skilled was 2.5 percentage points higher than someone with a sub-degree qualification for both cohorts.

***Figure 5.5:** Adjusted probability of multi-skilling by cohort and by age group*

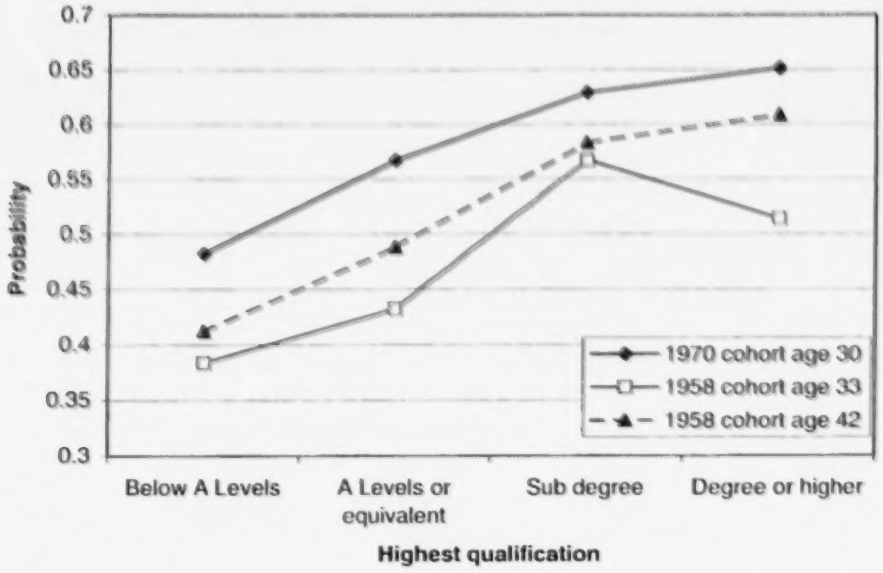

Figure 5.5 also suggests that there has been a general increase in multi-skilling for individuals at the start of their 30s (from the 1958 cohort in 1991 to the 1970 cohort in 2000) and during their 30s (from the 1958 cohort in 1991 at age 33 to the 2000 cohort at age 42). There is an increase in the likelihood of being multi-skilled as the level of qualifications increases from below A Level to A Level and then to sub-degree and on to degree. Rather surprisingly, for the 33 year-olds in the 1958 cohort, the probability falls from sub-degree to degree, a drop that may reflect the change in measurement of skills between the two surveys, though this seems unlikely to account for it entirely. It appears that although individuals with degrees were more likely to be multi-skilled than individuals with sub A Level qualifications, those with the sub-degree qualifications in the 1958 cohort at age 33 were likely to have the most skills of all.

5.14 *Figure 5.6 shows that in the 1958 cohort at age 33, women were more likely to be multi-skilled than men and to have slightly larger increases in the likelihood of being so as the level of education increased. In the 1970 cohort at age 30 the opposite was the case; men were consistently more likely to be multi-skilled than women. The exception was at degree level where the probabilities for the two sexes converged. By age 42 in the 1958 cohort the difference between the sexes persisted, but was greatly reduced (figures not*

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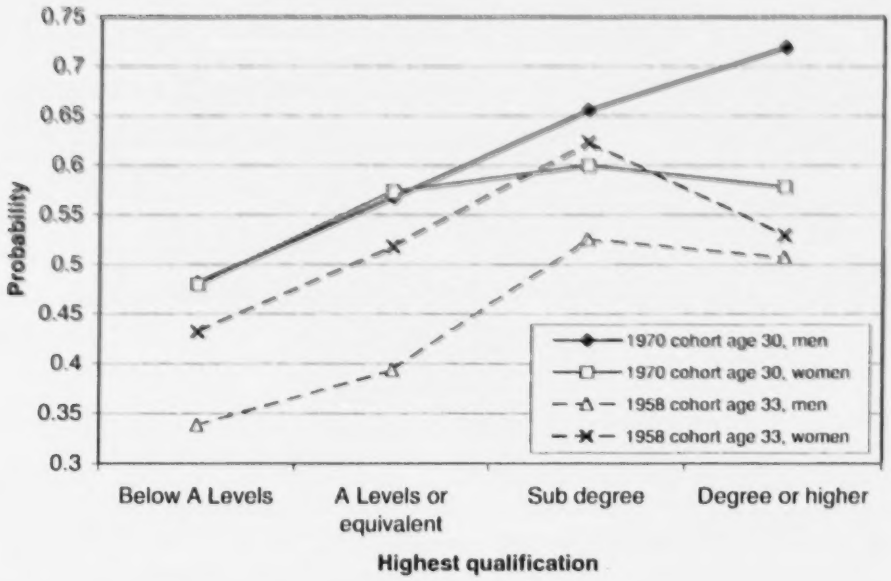
shown). Overall, for the 1970 cohort the figures show that men were more likely to be multi-skilled than women at all educational levels and that the gap tended to increase the higher the level of education, rising to about 1 percentage point for men for sub-degree level qualifications and almost 8 percentage points for women. There were further smaller increases for those with degrees.

***Figure 5.6:** Adjusted probability of multi-skilling by cohort and by gender*



5.16 The advantage that higher education appears to confer on graduates with respect to multi-skilling could be due to the nature of the work graduates do as opposed to others. We analysed this possibility by comparing cohort members working in manual and non-manual occupations (figures not shown). Although there were some minor variations, the overall picture of increased probability of multi-skilling among individuals with HE qualifications was sustained. It is also notable that HE qualifications had a larger effect in manual occupations than in non-manual occupations. There was an 8% gain attached to HE for people in manual occupations and between 3% and 5% for those in non-manual occupations.

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Computer skills

5.17 Finally, we turn to the issue of computer skills used at work. In the 2000 surveys respondents were asked 'Do you use a computer at work?' The answer 'yes' signified a computer user. The corresponding question in the 1991 survey asked the 1958 cohort members at age 33, 'In the work you do, do you ever use a computer or word processor with a TV-type screen (usually known as a VDU)?' The question was asked for the current and most recent job. This question was answered by a substantial amount of individuals who were not currently in work. We focus here on those individuals in work to ensure comparability across cohorts.

5.18 Figure 5.7 shows the effect of qualification level on the probability of using a computer at work, taking account of earlier circumstances and achievements. We can see that having a sub-degree level HE qualification increased the probability by 18 percentage points for the 1958 cohort at age 33 surveyed in 1991, by 21 percentage points for the 1970 cohort at age 30 and by 21 percentage points for the 1958 cohort at age 42. The comparable figures for having a degree were 34%, 34% and 32% respectively. More of the 1970 cohort in relative terms used computers than did the 1958 cohort at either age 33 or age 42. However, the probability of computer use increased between the two ages.

5.19 Examining these results by gender for the 1970 cohort at age 30 and the 1958 cohort at age 33 (Figure 5.8), we find that, as the level of education increased, there was an increase in the incidence of computer use for men in both cohorts. For women there was a relative dip in the probabilities of computer use for those with below degree level HE qualifications. Those with degrees showed the continuing upward trend. However, the overall increases in probability above A Levels were much smaller for women than they were for men; 25 and 27 percentage points respectively for the 1958 cohort women at age 33 and the 1970 cohort women at age 30. Women with sub-degree qualifications were just as likely to work with computers as women with sub-A Level qualifications.

5.20 With respect to the difference between the two 1958 cohort age groups, the proportion of female graduates using computers was 61% at age 33 and 73% at age 42 compared with the figures for men, 72% at age 33 and 83% at age 42. This can be interpreted as a 'period effect', showing an increased uptake of computers in all areas of employment by the time of the most recent surveys. Clearly, the 1958 cohort at age 33 was still operating in a labour market that had yet to catch up.

5.21 As for multi-skilling, we wanted to be sure that the effects on computer use found could be attributed to HE rather than to the status of the occupation subsequently entered, i.e. graduates get the best jobs, which also happen to

involve use of computers. Figure 5.9 compares for men in the 1970 cohort at age 30 and men in the 1958 cohort at age 33, the probability of using a computer at work in occupations classified as manual as opposed to those classified as non-manual. Notably, although a large cohort effect is evident, with the 1970 cohort showing consistently the higher probability of use across all qualification levels, the effects are indistinguishable between manual and non-manual occupations. Rising qualifications accompany a consistent increase in potential computer use with by far the highest probabilities manifested for HE graduates with degrees. This result was repeated in near identical form in comparing the HE effects on computer use between occupational classes at ages 33 and 42 in the 1958 cohort.

Figure 5.7: *Adjusted probability of using a computer at work by cohort and by age group*

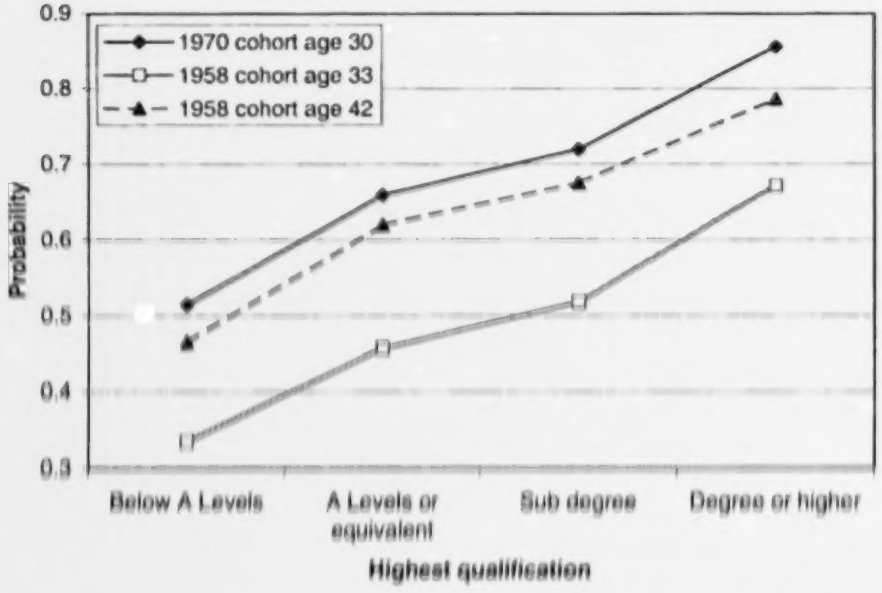

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Figure 5.8: *Adjusted probability of using a computer at work by cohort and by gender*

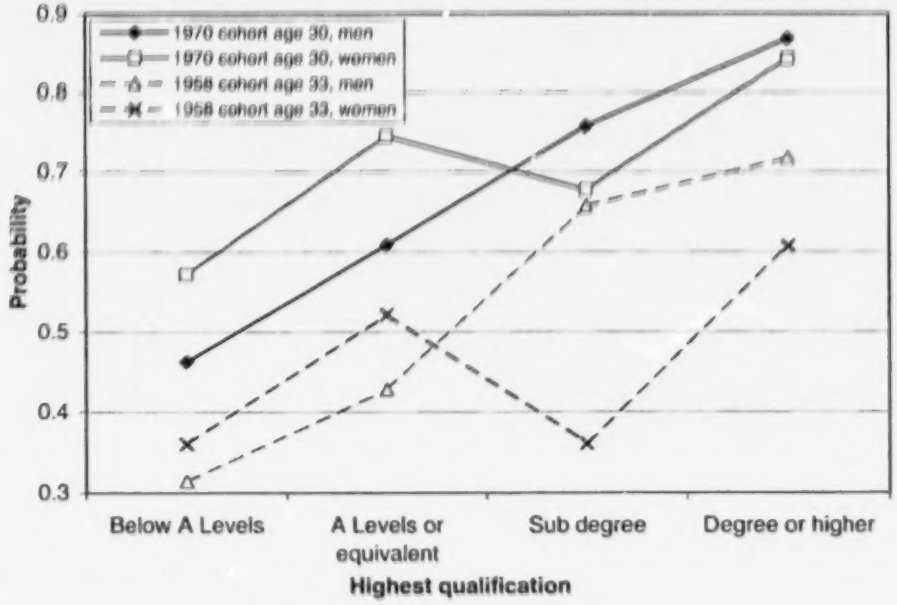
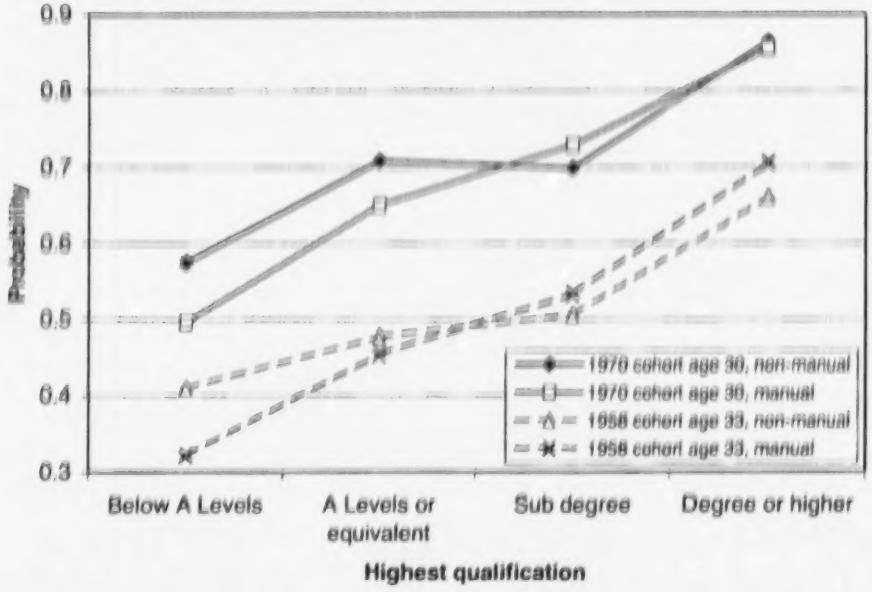


Figure 5.9: *Adjusted probability of using a computer at work by cohort and by occupation (manual and non-manual): men*



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6. Citizenship and values

6.1 In our previous report (Bynner and Egerton, 2001) we demonstrated higher levels of civic engagement among graduates compared with groups with other levels of qualifications as well as more evidence of 'democratic attitudes' in the sense of tolerance for other races and lack of 'political cynicism'. These findings point to a particular benefit of higher education in contributing to one of the government's major policy agendas – that of enhanced social cohesion. Graduates not only contribute to the economy but to the cohesiveness of society and demonstrate the attributes of active citizenship. In the present analysis we pursue these matters further, examining both attitudes (race tolerance, attitudes to authority, political cynicism) and behaviour (voting in elections, membership of voluntary organisations and attendance at Parent Teacher Associations). The scales used to measure the attitudes were treated as continuous and the HE effects on them analysed by OLS regression. (Full details of the construction of the scales together with their reliabilities are supplied in Appendix 3.) Behaviours were assessed as binary variables (member/not member) and the HE effects on them were analysed by logistic regression.

a) Support for race tolerance and support for authority

6.2 Support for race tolerance was measured with five items to which respondents were asked to indicate agreement or disagreement (e.g. 'alright for different races to get married'), with higher values indicating a more positive attitude towards people from other races (see Wiggins and Bynner, 1993). Race tolerance is seen as an important social cohesion measure in a multicultural society. Support for authority was measured using responses to six statements, which were broad expressions of authoritarianism, i.e. belief in the rights of authority whatever the merits of the case. Six statements comprise the scale including such statements as, 'the law should be obeyed even if a particular law is wrong'. The higher the value on the scale, the more authoritarian the respondent was in their attitude.

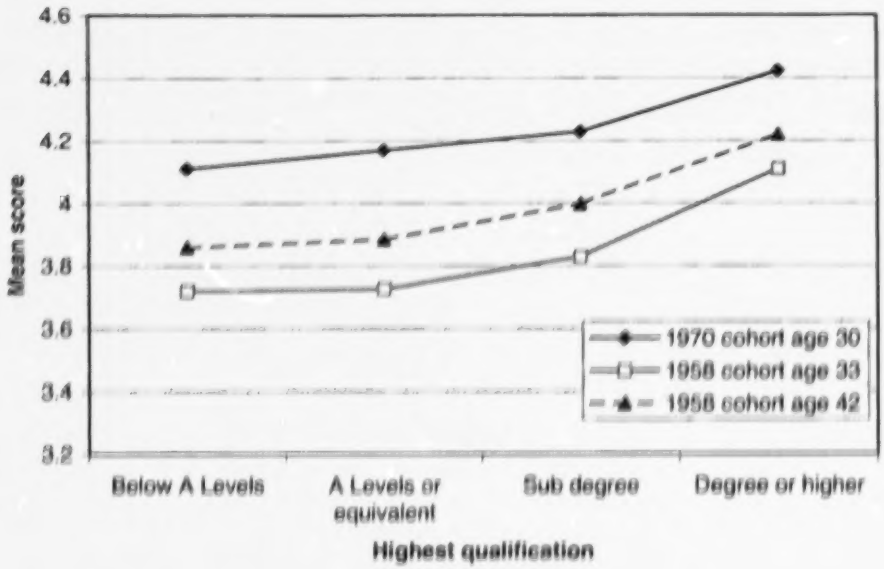
6.3 Figure 6.1 compares the impact of qualification level (with the standard controls applied) on 'race tolerance' between the 1970 and 1958 cohorts in the early 30s and the 1958 cohort at ages 33 and 42. Figure 6.2 shows comparable results for 'support for authority'.

Race tolerance

6.4 There was clear evidence of cohort and age effects in the estimated mean scores on the scale. The 1970 cohort at age 30 shows the highest level of tolerance; the 1958 cohort at age 33 shows a lower mean score and the 1958 cohort at age 42 shows the lowest mean score of all (Figure 6.1). Tolerance

increases steadily across qualification levels in all groups with a particularly substantial boost accompanying graduation with a degree.

***Figure 6.1:** Adjusted score for race tolerance by cohort and by age group*



Support for authority

6.5 Support for authority showed an almost identical picture to race tolerance, but in reverse (Figure 6.2). This time the higher the qualification level the *less likely* respondents were to espouse authoritarian views. Notably, the major gap here is again between the two levels of HE, below degree level and having a degree. Those with degrees were substantially more likely to reject unqualified support for authority. Figure 6.2 also shows differences across cohorts and age groups but not in line with those for race tolerance. The 30 year-olds in the 1970 cohort and the 42 year-olds in the 1958 cohort shared much the same level of support for authority – at a substantially higher level than the 33 year-olds in the 1958 cohort – clear evidence of a *period* effect. People were tending to become more authoritarian across the period 1991 to 2000, while the effect of HE was to push their views in the opposite direction.

6.6 Gender, social class and school attended showed a mixture of effects on these relationships, moderating them in minor ways, but not changing the shape of the overall HE relationship in the samples as a whole. Thus, although gender and school type appear to impact directly on these attitudes, they do not remove or moderate differentially the HE effect on them.

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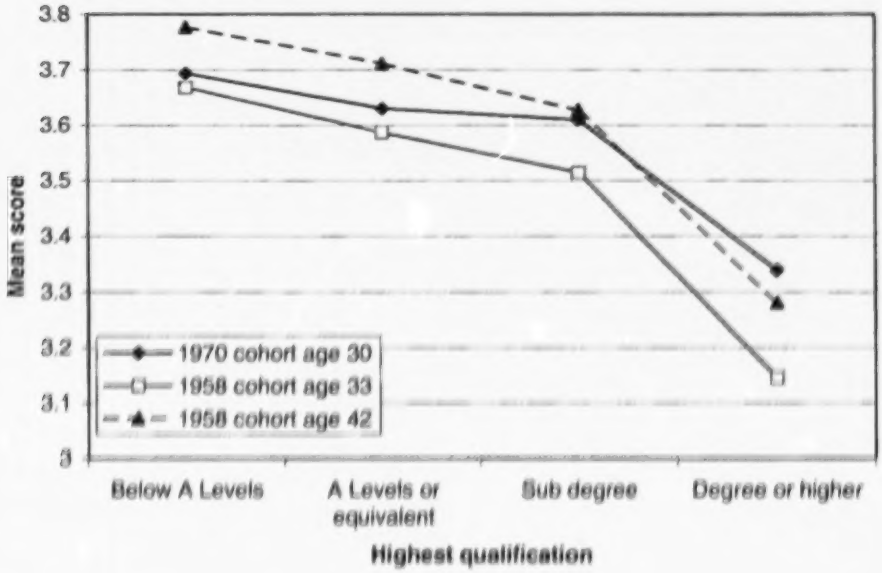
Figure 6.2: Adjusted score for support for authority by cohort and by age group



b) Political cynicism, interest and voting

6.7 Rising cynicism about politics among young people has been seen by social commentators as challenging the basis of democratic ideals (e.g. Wilkinson and Mulgam, 1995). It is therefore important to establish whether HE has any identifiable effect in inhibiting cynicism. Political cynicism was measured using responses to three statements, e.g. 'no political party would benefit me', with higher values indicating more cynicism. Previous studies have found political cynicism to be linked with a high level of 'external control beliefs', i.e., the belief that one cannot make a difference oneself. Political cynicism is also particularly likely to predict unwillingness to vote (Bynner and Ashford, 1994).

6.8 Figure 6.3 compares levels of political cynicism across the qualification groups between the two cohorts and between the 1958 cohort age groups. In line with the low turnouts at the last general election, the graphs reveal an interesting cohort shift towards cynicism among the younger cohort. At the same time, the 42 year-olds surveyed in 2000 are closer to the 30 year-olds in the 1970 cohort in their attitudes than to the 33 year-olds surveyed in 1991 in the 1958 cohort – a clear period effect. Apart from these shifts, it is perhaps reassuring to find that HE appears to place a powerful brake on the tendency towards cynicism in all groups. The effect is particularly notable between the two levels of HE, where gaining a degree appears to be a powerful antidote to

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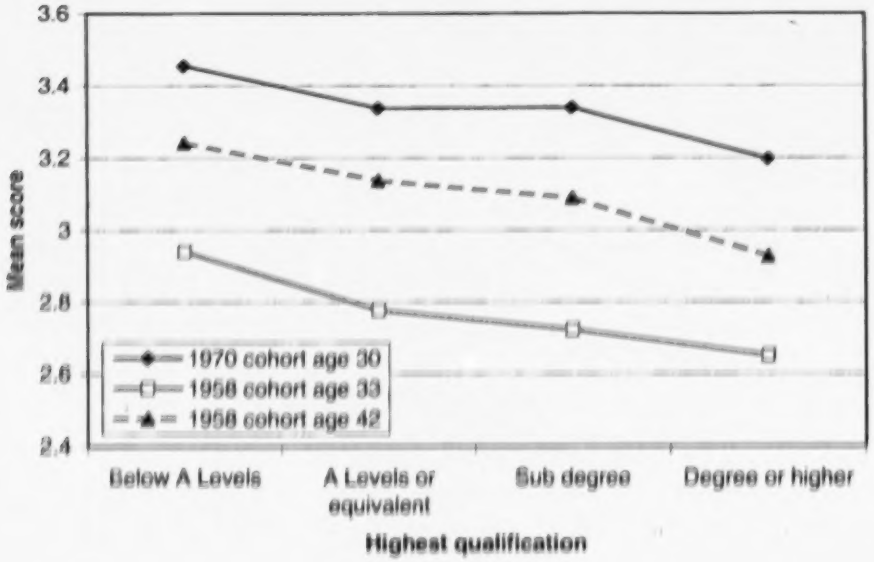
political cynicism. As shown in Figure 6.3, both a cohort effect and an age effect for political cynicism were apparent. In all groups a higher level of education corresponded with lower levels of political cynicism.

Figure 6.3: *Adjusted score for political cynicism by cohort and by age group*



6.9 As we might expect, the qualifications pattern for political cynicism was reversed in relation to voting in the last general election (the 1997 general election for the 1970 cohort at age 30 and the 1958 cohort at age 42, and the 1987 general election for the 1958 cohort at age 33, Figure 6.4). However, this time the striking difference across groups was reflected in a clear cohort effect. The 1958 cohort at ages 33 and 42 showed virtually identical probabilities of voting at all qualification levels. The big gap was with the 1970 cohort, who were far less likely to have voted. For the 1970 cohort, the difference across qualification levels showed a boost in voting, this time for both HE levels, whereas, for political cynicism, the major reduction came with gaining a degree.

6.10 Analysis by gender, social class and school attended showed relatively little change in the patterns of relationships across the different groups. However, there was a tendency for women with degrees to have higher levels of political cynicism and to be less likely to vote than men at the same qualification level. 'Dropouts' from higher education also showed higher levels of political cynicism and a reduced tendency to vote, particularly at age 33 in the 1958 cohort.

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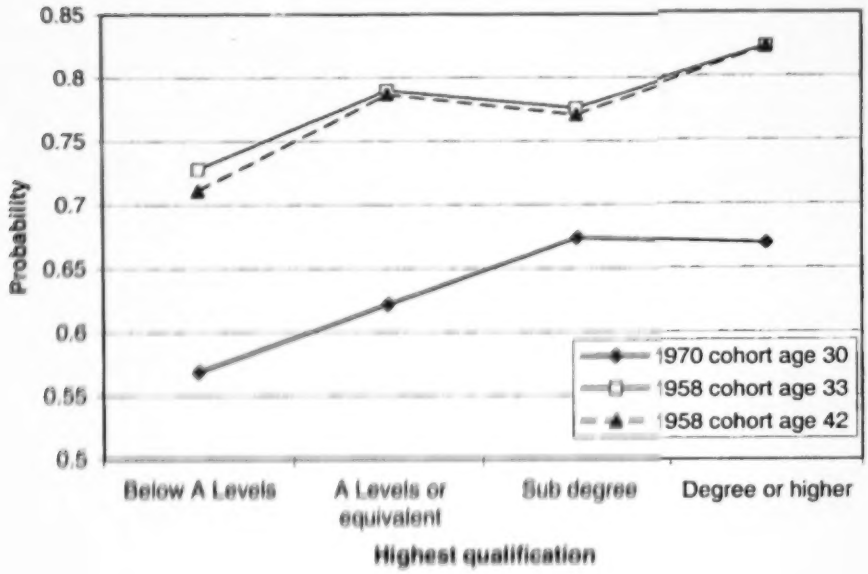
Figure 6.4: Adjusted probability of propensity to vote by cohort and by age group



c) Membership of a voluntary or charitable organisation and attendance at Parent Teacher Associations (PTAs)

6.11 Membership of voluntary and charitable organisations and attendance at the local PTA are seen as central elements of social capital (Putnam, 2000; Baron, Field and Schuller, 2000). Figure 6.5 shows the probability of membership of a charitable organisation across the cohorts and age groups. Figures 6.7 and 6.8 show the probability of attendance at the local PTA among cohort members with children over the age of 5, with separate analyses for men and women.

Membership of a voluntary or charitable organisation

6.12 Membership of a voluntary or charitable organisation shows a strong HE effect, with the highest probabilities of membership residing in the two HE groups, and with the highest level of all associated with degrees. The gradient is steepest for the 1958 cohort at age 42 and weakest for the 1970 cohort at age 30. This points to a relative decline across all qualification levels in memberships with age. The highest probabilities of membership were for the 1958 cohort at age 42, except at the lowest qualification levels where the probabilities converged across cohorts and across age groups.

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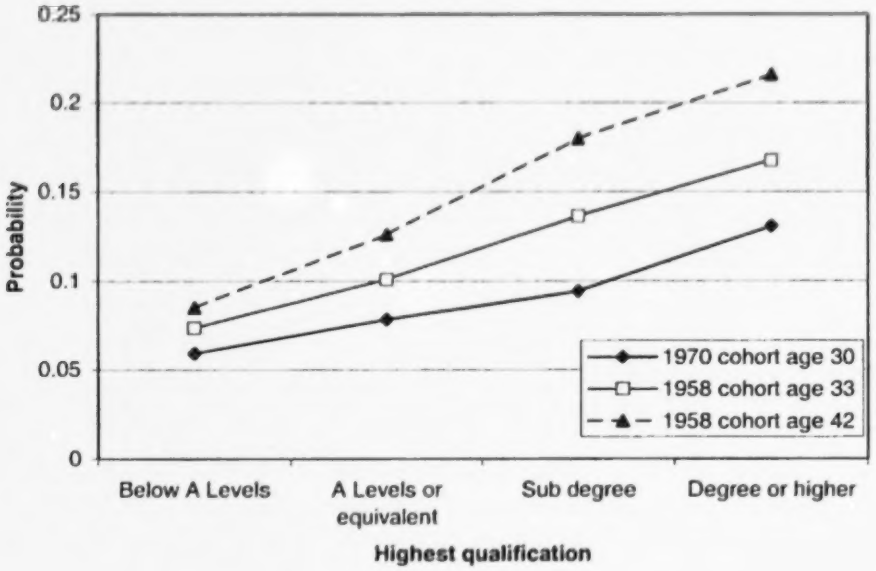
Figure 6.5: *Adjusted probability of having ever belonged to a charitable organisation by cohort and by age group*



PTA attendance

6.13 At age 33 there were a total of 3,350 fathers (60% of 1958 cohort men) and 3,838 mothers (66% of 1958 cohort women). At age 42 the numbers had increased to 3,771 fathers (67%) and 4,040 mothers (70%). In the younger cohort the apparent socio-historical effect of later and less childbearing can be seen: 2,051 (28%) were fathers and 2,867 (50%) were mothers at age 30. In order to compare the subgroups with regard to attendance at PTAs, only those who had school aged children aged 5 or above were included in the analyses. The attendance estimates for are reported in Figures 6.6 and 6.7.

6.14 PTA attendance showed one of the few examples of major cohort shift in the HE effect. There was a strong gradient across the qualification levels in the probability of attendance in the 1958 cohort at both age 33 and age 42 – with exceptionally high probabilities for cohort members with degrees. But for the 1970 cohort, the probability of PTA attendance is substantially lower at all levels and there was no evidence of an HE effect. This result applied for both men and women but notably, the probabilities of attendance were higher throughout for women rather than for men. It is not obvious why the 1970 cohort was so different from the 1958 cohort with respect to PTA attendance. It may reflect reducing interest in PTAs in the more recent cohort; or the younger age of the 1970 cohort's children may be connected to lower levels of involvement or even lack of a PTA, for their parents. The finding clearly presents a challenge to policies directed at increasing the involvement of

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parents in their children's education, which extends beyond the issue of parents' educational level.

Figure 6.6: Adjusted probability of attendance at a Parent Teacher Association among men who have at least one school aged child (age 5 or above)

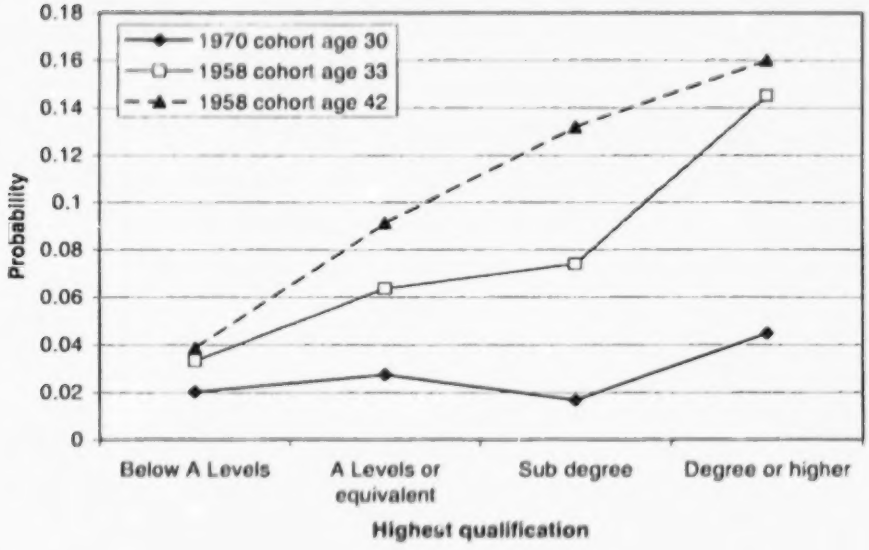
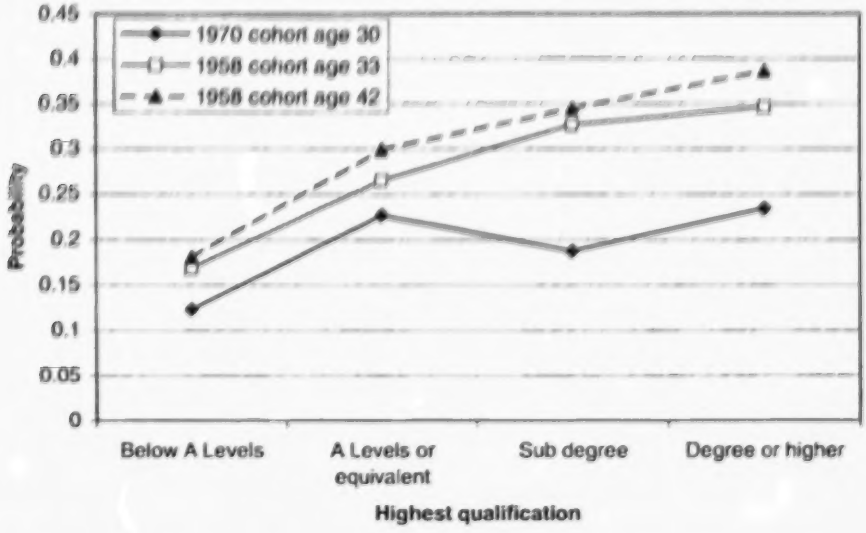


Figure 6.7: Adjusted probability of attendance at a Parent Teacher Association among women who have at least one school aged child (age 5 or above)



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7. Benefits to graduates' children

7.1 As part of the 1991 follow-up for the 1958 cohort (age 33), an additional one-third sub-sample survey was carried out of cohort members and their children. The parents were interviewed about their children and their children were assessed using a variety of standardised tests.

7.2 In this final section we assess how three measures of parenting behaviour and the child's recorded cognitive development varied with the higher qualification level of their parents. The three parenting variables were selected as applying to sufficient numbers of children at different ages to make analysis worthwhile: how often the parents and the children ate together; how often the parents read to the child; and how many books the child had.

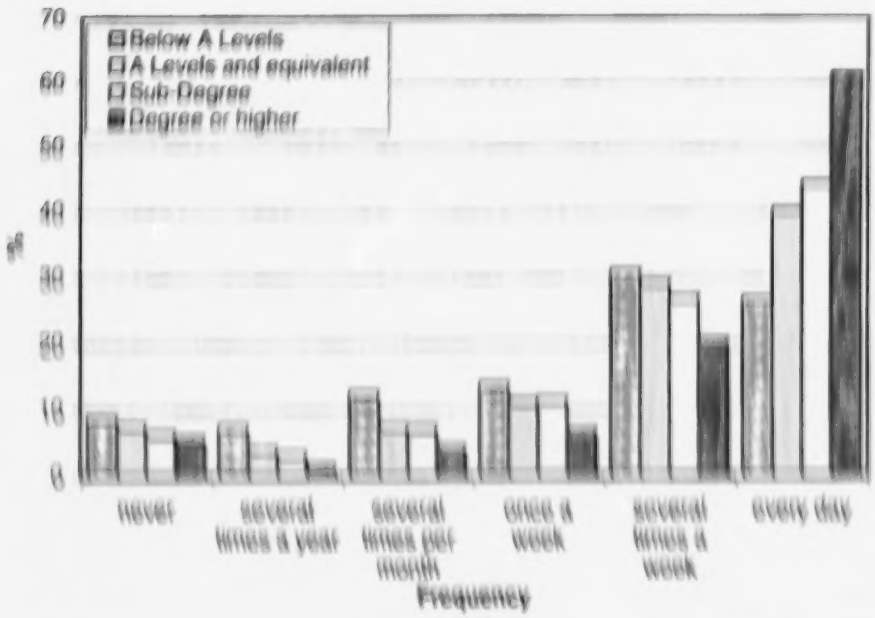
7.3 All children over 5 years of age completed ability tests using, among other measures, the Peabody Individual Attainment Test (PIAT) for reading comprehension, reading recognition and maths assessments. The children's age-standardised scores were examined in relation to the qualification level of their parents.

a) Parenting behaviour

7.4 Although there was little evidence of an HE effect for family meals, the other two parenting measures did show modest gradients in the direction of positive benefits from HE in relation to parenting. But because of the relatively small numbers involved, in the presence of controls, including the age of the child the statistical significance of the HE effects could not be established unequivocally. We consider here only the results for reading to children and how many books the family owned.

7.5 Figure 7.1 shows that over 60% of graduates read to their children every day, compared with 45% of those with sub degree HE qualifications and 40% of those with A Levels. Below this level only 35% of parents read to their children every day. Children of cohort members with HE qualifications were similarly more likely to own large numbers of books than were those with parents with other qualifications. Over 40% of children with HE parents had more than 50 books compared with 35% of those with A Level parents and 20% with parents below this level.

***Figure 7.1:** Frequency with which parents read to their children by higher education level*



7.6 Figure 7.2 shows the OLS regression results for frequency of reading (see Appendix 3). The HE effect is shown in adjusted and unadjusted form taking account of the standard set of controls, together with the age of the child. In the unadjusted form there is a clear gradient in the frequencies across the qualification levels, which reduces substantially in the adjusted form. The difference between A Levels and sub-degree level qualifications is effectively removed. However, degree level qualifications still stand out as having the highest estimated frequencies.

7.7 In the case of the number of books owned by the family, the actual number proved to be less significant than the presence of relatively large numbers above the threshold of 50 at this level. In other words, in line with previous results (Bynner and Egerton, 2001), a clear HE effect was apparent. Children with HE parents were substantially more likely to own more than 50 books than were children of parents without HE level qualifications.

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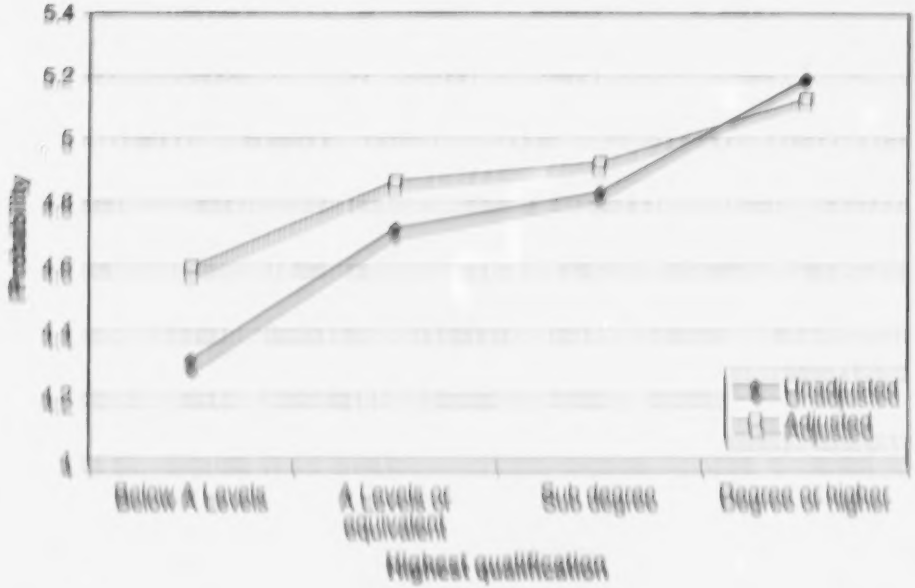
Figure 7.2: Adjusted and unadjusted frequencies of reading to children in 1958 cohort at age 33



b) Maths and reading attainment

7.8 Reading and maths attainment tests were administered only for children over 5 years of age. As stated above, those with high qualifications tend to be older when they become parents; consequently, there are a substantially smaller number of younger children for the groups with higher qualifications. A full regression analysis was therefore not possible due to the small number of cases. The results presented below represent the mean ability scores of children born to cohort members in each qualification category. These were obtained through an ordinary least squares (OLS) regression which adjusted for only three other variables: the child's age (by the use of standardised scores); the parent's ability (using the cohort member's childhood ability score); and family homogeneity as reflected in the fact that approximately one third of the children had the same parents.

7.9 Figure 7.3 displays the mean percentile score on the three tests for children by parental qualification level. The overall trend in the data was for increasing test scores with parental qualification, with a clear rise from A Level to HE. For the first levels of the qualification variable (A level and below degree level HE), there was an increase in the mean score for each of the three abilities. At

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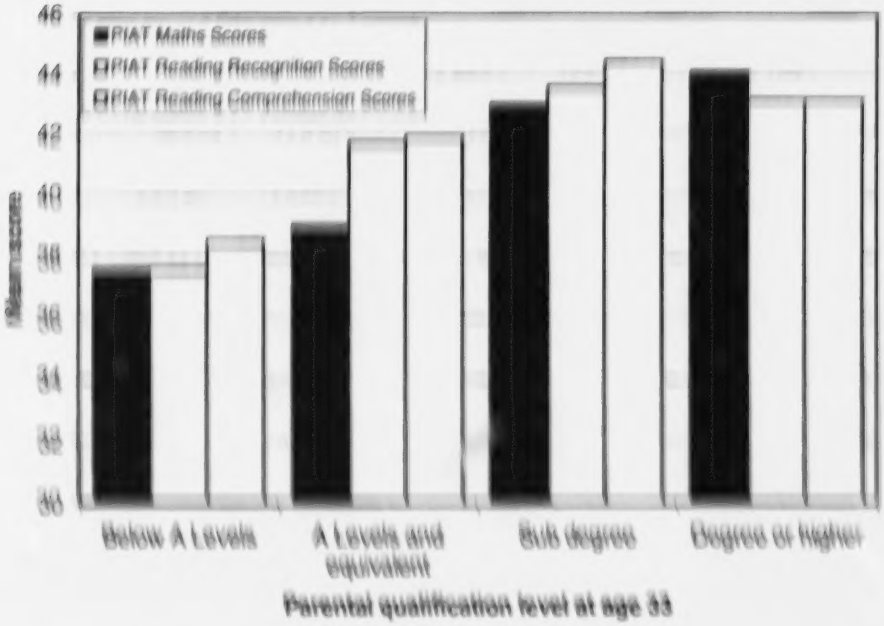
the highest level, the mathematics scores continued to increase for children of graduates with degrees, but the reading scores decreased slightly.

***Figure 7.3:** Cognitive ability percentile scores of 1958 cohort children by parental qualification level at age 33 (adjusted for parental childhood scores and family homogeneity)*



7.10 These results give an initial indication that parents with HE promote a stronger educational family environment relative to parents at other qualification levels. HE parents do more reading to children and have more books in the home, and there are enhanced cognitive scores for their children. These differences are sustained even after accounting for the age of the children and the early educational attainment of the children's parents. However, the analysis is hindered by the age structure of the population of children in addition to the small number of cases in the highest qualification categories. More extensive data are required to establish unequivocally the size of any HE effect.

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8. Conclusions

8.1 The results presented here comprise a rich tapestry of benefits that our analysis suggests can be attributed to higher education (HE). Using sophisticated techniques of analysis to control for variables that might be confounded with higher education in producing its apparent effects, we were able to show that the results obtained in our earlier analysis were sustained. Higher education appears to bestow on those who receive it a number of benefits, which in most cases are enhanced further through obtaining a university degree.

8.2 By comparing differences between cohorts in the early thirties and differences across age groups for the 1958 cohort, we were also able to show that these effects generally did not diminish across cohorts. Some of them did, however, reduce with age. In some cases, there was clearly a 'ceiling effect' in that the graduate return had been obtained during the period after leaving higher education and was fully manifested by the early thirties. At the older age of 42, other experiences in the workplace or at home took over from higher education in producing benefits, so the higher education effect was reduced. In relation to cohort effects, in almost all cases, there was relatively little difference between the earlier cohort's benefit from HE at age 33 in 1991 and that of the younger cohort at age 30 in 2000.

8.3 We also extended our analysis in a number of areas. First, we exploited the geographical coverage that the British Birth Cohort Studies provide by examining the mobility of graduates from their geographical location when born to where they were living at the time of the surveys. There was striking evidence of movement, particularly in the 1958 cohort by age 33 to the more economically affluent areas of London, the South East and the South West, and away from the north of England. Some of this movement appeared to be reversed by the time the cohort reached age 42 suggesting some movement out of these popular areas as people became more established in their careers, or possibly through the pressure of the housing market. The movement was also less evident in the 1970 cohort than in the 1958 cohort, but again, this is probably complicated by the problems faced by graduates in getting housing, particularly in London. There was also the growing attraction of alternative locations for employment bound up with the recovery of the economy in many areas compared with the situation in the early 90s.

8.4 These results extended to the nature of employment where the highest levels of professional employment were concentrated in London and the South East. In other parts of the country there was more evidence of movement into intermediate and skilled non-manual occupations by graduates. One possible negative consequence of the attraction to graduates of London and the South was the accompanying decline in the numbers in skilled non-manual occupations. There was differential loss here compared with other regions

such as the South West. In the case of the North there were losses at all levels of the occupational structure.

8.5 In relation to health and health behaviour, we were able to extend our earlier findings (as published in our 2001 report) to demonstrate the same striking reduction among graduates in signs of depression, as measured by the Malaise Inventory, the higher ratings of self-reported health and also, for the first time, the reduced level of the Body Mass Index (BMI), the indicator of obesity. Cohort members with HE experience were also far less likely to smoke; though those who did smoke were no more likely than others to smoke less. It was particularly striking in the 1958 cohort that 'dropouts' showed a downturn in indicators of good health compared with those who had continued with higher education and gained degrees. Again, the results were sustained across cohorts and across age groups; though once again, there was a slight decline in the HE return as age increased.

8.6 The notable point about these analyses was that we were able to build in controls comprising earlier measures of health status, including depression, in the middle teens. Thus, we could confidently say that the return occurred through subsequent experiences, the most prominent of which would have been participation in higher education. Thus, even taking into account early smoking as well as family background and early educational achievement, graduates were less likely to smoke than non-graduates. Again, we conclude that the higher education experience itself has, for whatever reason, played a part in diminishing the tendency to smoke.

8.7 With respect to labour market benefits, our results demonstrate clearly the protective value of higher education for graduates against the risk of unemployment in the early stages of a career. Graduates were consistently less likely to be unemployed between the ages of 25 and 30. Graduation also contributed to social mobility particularly for those who started off at the lower levels of the socio-economic status scale. However, there were indications in this case that the more recent 1970 cohort showed less signs of social mobility than the earlier one. In other words, this was a case where the increased numbers of graduates in society brought about a 'ceiling' on the social mobility to be gained from a university qualification. With respect to skills gained by graduates, we were able to demonstrate that HE experience contributes to the multiple skilling of individuals for both men and women, and in different types of employment. In this respect, graduates were clearly in tune with the modern economy. With respect to computer skills, far more of those who had higher education had gained these skills. This was enabling them to occupy the key labour market niches, where such skills were at a premium.

8.8 In relation to the non-market potential benefits of HE, as reflected in democratic values and political and social participation, we were able to

demonstrate that graduates showed more of the attributes identified with modern citizenship. They were most likely to hold tolerant attitudes to other races than their own, were less likely to be dismissive and cynical about politics and politicians and more likely to engage in the political system as reflected in voting. They were also less likely to be narrowly authoritarian in their attitudes, suggesting that their higher education experience equipped them to question authority rather than accept it blindly. They were also more likely than other groups to be members of charitable organisations. When they had children, they were the most likely parents to actively participate in the PTA. There were some signs though, particularly in relation to this last activity, of a decline in this involvement between cohorts. Thus, the graduate parent members of the 1958 cohort tended to be most active in PTAs. This was much less evident for the 1970 cohort graduate parents, suggesting a drop in this form of civic engagement among the more recent generations of parents and a reducing HE effect.

8.9 In relation to parenting, graduates appeared to supply the educational environment at home that educators would favour. They were likely to have many more books than people with lower levels of qualifications; they were likely to read to their children, and their children tended to have superior scores on cognitive and behavioural tests. Such results took account of the graduates' own early circumstances, experience and achievements, and so did represent a relatively 'pure' HE effect. We might say that graduates not only gain the human capital to give them access to the higher echelons of the occupational structure, but also supply the cultural and educational capital that will provide sound foundations for their own children's education.

8.10 Finally, we return to the point made earlier in this report, namely that the expansion of university entrance, together with the increase in the number of graduates that this brings, is likely to be accompanied by diminishing returns as the benefits of HE become diluted. Our results tend to challenge this viewpoint. Generally, the reduction in benefits for the more recent 1970 cohort was not evident from our results; rather the benefits were sustained in virtually all domains of life that we studied. The main exception was for social mobility where, as part of the rising occupational status of the population generally, diminishing returns were apparent in relation to further advancement up the socio-economic scale in later careers. There were also signs that for some indicators of community participation, particularly PTA attendance, the HE effect was higher in the earlier generation.

8.11 We have to conclude, therefore, that higher education and the graduates it produces are continuing to produce benefits to individuals and society in a variety of areas. Clearly, graduates contribute to the economy in filling the professional and other slots at the upper levels of the occupational structure. It is quite probable too, that their existence in the labour market contributes to the creation of jobs which they are then available to fill. Therefore, worries

about overachievement and underemployment of graduates, are probably misplaced. There may be temporary situations where graduates are doing jobs that non-graduates in the past would have done, but over time it is likely that those jobs will themselves be deemed as worthy of graduates and done in a different way. Hence the labour market benefits from the extra skills and efficiency that graduates supply.

8.12 In relation to social participation and citizenship, the benefits of having graduates in the community are clear. We cannot say that graduation is, in any sense, a pre-requisite for the accumulation of social capital and active citizenship but we can say that of all sections of the population, graduates are the most likely to manifest these qualities. Under a government policy agenda to enhance social cohesion, we may therefore see some merit in investment in higher education as making a positive contribution to its realisation.

8.13 In short, the presence of graduates in the community can only be seen as beneficial. In this sense the 'private' returns individual graduates gain from higher education need to be seen in a broader context. Apart from the returns in terms of increased earnings, consumption patterns and lifestyle that graduates enjoy, graduates also cost the community less. They are less likely to require social security benefits to see them through periods of unemployment, because their high employability relative to other groups makes it less likely that they will be unemployed. Their generally higher levels and health and healthier life style mean they are likely to place less burden on the National Health Service. They also contribute to social cohesion through the values they hold and the voluntary and community activity that they undertake. They provide these benefits not only directly, but also indirectly through the transmission of their own educational capital to their children. This intergenerational transfer helps to ensure that the next generation will not only enjoy HE benefits personally, but will also contribute to the well being of society as a whole.

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Appendix 1: Categorisation of educational qualifications

HIGHEST EDUCATIONAL QUALIFICATION 2000	HIGHEST EDUCATIONAL QUALIFICATION 1991
Degree or higher	**Degree or higher**
* Higher degree (e.g. MA, PhD)	* Higher degree (e.g. MA, PhD)
* Post Graduate Certificate of Education	* Post Graduate Certificate of Education
* Degree (BA, BSc)	* Degree (BA, BSc)
* NVQ5 and NVQ6	
Sub-Degree (Diploma) or equivalent	**Sub-Degree (Diploma) or equivalent**
* BTEC Higher Certificate/Diploma	* BTEC etc, Higher National/General Certificate
* Professional degree level qualifications	* Nursing qualification
* Nursing/paramedic	* Higher Education Diploma
* Higher Education Diploma	* HNC/HND or SHNC/SHND
* HNC/HND	* City and Guilds Full Technological
* Other teacher training qualification	* C&G Insignia (downgraded in 2000)
* City & Guilds Part 4/Full Technical	* Non CNAA Polytechnic Diploma or Certificate
* RSA Higher Diploma	* Full professional qualification
	* Part professional qualification
A Levels or equivalent	**A Levels or equivalent**
* BTEC National Certificate	* A Levels or equivalent
* A Levels (2 A Levels)	* BTEC etc National/General Certificate or Diploma
* AS Levels	* A Levels
* Scottish Higher	* Scottish Higher
* Scottish Certificate of 6th Year Studies	* Scottish Certificate of 6th Year Studies
* Advanced GNVQ	* ONC/OND or SNC/SND
* BTEC National Diploma	* City and Guilds Part II or III/Advanced/Final
* ONC/OND	* RSA Stage 3 (RSA Stage 3 coded as below A Levels in 1991)
* NVQ3	* JIB/JNC/other craft
* City & Guilds Part 3/Final/Advanced Craft	
* RSA Advanced Diploma	
* Pitmans Level 3	
Below A Levels	**Below A Levels**
* GCSE grades A-C (from 1988 onwards)	* GCSE grades A-C
* Levels grades A-C	* GCE O Levels grades A-C
* Levels grades D-E (not GCSE)	* CSE grade 1
* CSE grade 1	* Scottish Standard grades 1-3
* Scottish Standard grades 1-3	* Scottish O Grade grades A-C
	* City and Guilds Part 1/Craft/

* Scottish Lower or Ordinary grades
* Intermediate GNVQ
* BTEC First Certificate
* BTEC First Diploma
* (O Levels and below)
* Apprenticeships
* City & Guilds Part 2/Craft/Intermediate
* City & Guilds Part 1/Other
* RSA First Diploma
* Pitmans Level 2
* CSEs grades 2-5
* Scottish standard grades 4-5
* Other Scottish school qualification
* Other GNVQ
* Other NVQ
* Units towards NVQ
* RSA Certificate/Other
* Pitmans Level 1
* Other vocational qualifications
* City and Guilds/Other/Could not say which
* HGV
Intermediate/Ordinary
* City and Guilds Operative
* RSA Stage 2
* GCSE grades D-G
* CSE grades 2-5
* Foundation GNVQ
* RSA Stage 1
* Other technical or business qualification (PSV, HGV etc.)
* Any other qualification
* City and Guilds/Other
* City and Guilds could not say which

Appendix 2: Statistical methodology

Effects of changing regressors

Regression

Suppose we have the regression equations (ignoring error terms):

$$Y_B = \alpha_B + \beta_B X + \delta_B D \qquad \text{1970 cohort} \qquad 1.$$

$$Y_N = \alpha_N + \beta_N X + \delta_N D \qquad \text{1958 cohort} \qquad 2.$$

D dummy for degree. X is a regressor.

We want to measure the effect of having a degree, for example, to know whether the effect of a degree has got larger over time.

The marginal effects for each cohort

δ_B shows the effect of having a degree relative to someone with the same X in the 1970 cohort. ($E(Y_B|D=1) - E(Y_B|D=0)$)

δ_N shows the effect of having a degree relative to someone with the same X in the 1958 cohort.

If $\delta_B > \delta_N$, degree has a bigger effect relative to someone else with the same X in the same cohort.

Total effect

Some analyses want to compare the effect of having a degree compared with not having a degree over time relative to a fixed point, say, the 1958 cohort position.

Suppose the baseline is someone with characteristics X in the 1958 cohort who has no degree:

$$Y_N^0 = \alpha_N + \beta_N X \qquad 3.$$

The comparison for somebody in the 1970 cohort:

$$Y_B^1 - Y_N^0 = \alpha_B - \alpha_N + (\beta_B - \beta_N)X + \delta_B D \qquad 4.$$

The full effect of having a degree in the 1970 cohort compared with not having a degree in the 1958 cohort is:

$$Y_B^1 - Y_N^0 = \alpha_B - \alpha_N + (\beta_B - \beta_N)X + \delta_B \qquad 5.$$

cohort effect, degree effect

The comparison for somebody in the 1958 cohort $Y_N^1 - Y_N^0 = \delta_N$ 6.

There is no cohort effect for the 1958 cohort comparison.

The impact of a degree over time is:

$$Y_B^1 - Y_N^1 = \alpha_B - \alpha_N + (\beta_B - \beta_N)X + (\delta_B - \delta_N) \qquad 7.$$

cohort effect, difference in degree effects

Equation 7 appears to capture what many people are saying. If the difference is 5 units, it says that the effect of having a degree is 5 units greater in the 1970 cohort than it was in the 1958 cohort. Notice that most of this may be due to a cohort (trend) effect rather than the degree effect. However the difference in the marginal degree effects $(\delta_B - \delta_N)$ does measure the 'pure' contribution of a degree to the overall change.

Comparison

Which is best depends on the question.

The marginal effects show the impact of having a degree compared with other members of the cohort but equation 7 shows that differences in their values can be interpreted as the 'pure' effect of degree over time.

The total effect shows the full effect of having a degree over time but it includes the cohort effect.

The cohort effect is not due to having a degree. Someone without a degree benefits to the same extent from the cohort effect.

There is a case for the marginal effects. The marginal effects can be compared over time. Their difference shows that part of the total effect, which is a 'pure' degree effect. It can be the increase in the value of *Y* that can be attributed solely to the change in the impact of a degree.

Logit

Suppose we have the equations:

$$\Pr(Y_B = 1) = \Lambda(\alpha_B + \beta_B X + \delta_B D) \qquad \text{1970 cohort} \quad 8.$$

$$\Pr(Y_N = 1) = \Lambda(\alpha_N + \beta_N X + \delta_N D) \qquad \text{1958 cohort} \quad 9.$$

D dummy for degree. X is a regressor. Λ is the logit distribution function.

We want to measure the effect of degree, for example, to know whether the effect of a degree has got larger over time.

Marginal effects

The marginal effects are:

$$\Pr(Y_N = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 0) = \Lambda(\alpha_N + \beta_N X + \delta_N) - \Lambda(\alpha_N + \beta_N X) \qquad 10.$$

$$\Pr(Y_B = 1 \mid D = 1) - \Pr(Y_B = 1 \mid D = 0) = \Lambda(\alpha_B + \beta_B X + \delta_B) - \Lambda(\alpha_B + \beta_B X) \qquad 11.$$

Unlike the regression case, the values of the marginal effects depend on the value of X. Even if $\alpha_B=\alpha_N$, $\beta_B=\beta_N$ and $\delta_B=\delta_N$, the values of the marginal effects would be different if different values for X were used.

If we used the same value of X, say X^*, to evaluate 11 and 12, then we would have comparable values for each cohort of the effects of having a degree analogous to the comparison of δ_B and δ_N in the regression example above.

These marginal effects still show the effect of having a degree compared with someone who does not have a degree for the same cohort.

The log odds ratios are δ_B and δ_N. They compare the log odds for individuals with and without a degree in the same cohort. If $\delta_B>\delta_N$, degree has a bigger effect relative to someone else with the same X in the same cohort.

Total effect

Suppose the baseline is someone with characteristics X in the 1958 cohort who has no degree:

$$\Pr(Y_N = 1 \mid D = 0) = \Lambda(\alpha_N + \beta_N X) \qquad \text{1958 cohort} \quad 12.$$

The probabilities for individuals with degrees are:

$$\Pr(Y_B = 1 \mid D = 1) = \Lambda(\alpha_B + \beta_B X + \delta_B) \qquad \text{1970 cohort} \qquad 13.$$

$$\Pr(Y_N = 1 \mid D = 1) = \Lambda(\alpha_N + \beta_N X + \delta_N) \qquad \text{1958 cohort} \qquad 14.$$

Comparing someone in the 1970 cohort with a degree to someone in the 1958 cohort without a degree:

$$\Delta^1_B = \Pr(Y_B = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 0) = \Lambda(\alpha_B + \beta_B X + \delta_B) - \Lambda(\alpha_N + \beta_N X) \qquad 15.$$

$$\Delta^1_B = \Lambda(\alpha_B + \beta_B X + \delta_B) - \Lambda(\alpha_B + \beta_B X) + \Lambda(\alpha_B + \beta_B X) - \Lambda(\alpha_N + \beta_N X) \qquad 16.$$

degree effect (1970 cohort)

Comparing the 1958 cohort with a degree to the 1958 cohort without a degree is:

$$\Delta^1_N = \Pr(Y_N = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 0) = \Lambda(\alpha_N + \beta_N X + \delta_N) - \Lambda(\alpha_N + \beta_N X) \qquad 17.$$

degree effect (1958 cohort)

Comparing the probabilities of someone with a degree across the cohorts. (This is equivalent to the decomposition of $Y^1_B - Y^1_N$ in the regression case.)

$$\Delta_{BN} = \Pr(Y_B = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 1) \qquad 18.$$

$$\Delta_{BN} = \left[\Pr(Y_B = 1 \mid D = 1) - \Pr(Y_B = 1 \mid D = 0)\right] - \left[\Pr(Y_N = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 0)\right] + \left[\Pr(Y_B = 1 \mid D = 0) - \Pr(Y_N = 1 \mid D = 0)\right] \qquad 19.$$

where:

$\Pr(Y_B = 1 \mid D = 1) - \Pr(Y_B = 1 \mid D = 0)$ is the marginal effect for the 1970 cohort

$\Pr(Y_N = 1 \mid D = 1) - \Pr(Y_N = 1 \mid D = 0)$ is the marginal effect for the 1958 cohort

$\Pr(Y_B = 1 \mid D = 0) - \Pr(Y_N = 1 \mid D = 0)$ is the cohort effect for someone without a degree

We obtain essentially the same decomposition as in the regression case.

Δ_{BN} = degree effect (1970 cohort) – degree effect (1958 cohort) + cohort effect 20.

difference in marginal effects, cohort effect

Comment

The marginal effects computed for the logits essentially use a standard value of $X=X^*$ to evaluate the marginal effects. The marginal effects are comparable in the sense that any differences reflect differences in δ_B and δ_N rather than X.

The values of the marginal effects are still cohort specific. The marginal effect for the 1958 cohort shows the effect of having a degree compared with not having a degree for someone in the 1958 cohort. They are still cohort specific because the $\Lambda(\alpha_B + \beta_B X) \neq \Lambda(\alpha_N + \beta_N X)$ even at the same value of X.

The equations for Δ_{BN} show that we can interpret the difference in the marginal degree effects as the contribution of the changing impact of degree to the overall change in the probability of Y=1.

These equations for Δ_{BN} show that the change in probabilities from one cohort to another reflect the change in the marginal effects.

Appendix 3: Outcome variables

The outcome variables comprise the specification of the two types of variable used in the analysis: discrete (binary) and continuous. They span behavioural outcomes measured in binary or continuous form e.g. member/not member and amount of time spent. They also include indexes such as the Body Mass Index comprising a function of two or more variables. Indexes also include scales constructed to measure underlying attitudes to different topics. These comprise groups of opinion statements responded to on scales of agreement/disagreement, which factor analysis has shown to be internally consistent as indicated by 'factor loadings'. The scores of the individual items are then aggregated to produce the attitude scale score. The most widely used criterion for 'reliability' (internal consistency) of the scale score is Cronbach's alpha (α) coefficient with a range of 0 to 1. A coefficient exceeding 0.6 is usually taken as indicating an adequate level of reliability. Factor loadings and reliabilities are given in the specification of the three attitude scales used in the analysis.

Health

Psychological state (depression). This was based on a continuous scale comprising 24 items (the 'Malaise' inventory). The cut-point was 7, with those scoring 8 or more categorised as 'depressed'.

General health was coded to two categories 'excellent' vs. 'other', which included good, fair and poor. The same variable was available on BCS70 and NCDS Sweep 4 (1981).

Obesity. Weight in kilograms divided by height in metres squared.

Smoking. The five categories of response to the question about current smoking – never, not now, occasionally, every day – were grouped into two categories 'smokes now', 'does not smoke'. Number of cigarettes smoked was treated as a numerical variable measured on a continuous scale.

Labour market

Unemployment. The economic activity variable was coded to two categories: 'employed' and 'unemployed or economically inactive' over the period 25 to 30.

Respondent's Class. This variable was pre-coded into the Registrar General's six social class groups: I (professional), II (intermediate), IIInm (skilled non manual), IIIm (skilled manual), IV (partly skilled), V (unskilled). Only those currently employed were included in the analysis. Family social class based on father's occupation was coded into the same social class categories using the Registrar General's classification at the time of the cohort member's birth.

Computer skills. This was a binary variable distinguishing between respondents who said they used a computer at work currently from those who did not.

Attitudes

Race tolerance, support for authority, political cynicism

These variables were continuous scales obtained by aggregating the scores across sets of opinion items to each of which the response categories were "strongly agree" (1), "agree" (2), "can't decide" (3), "disagree" (4), "strongly disagree" (5), adjusting the direction of scoring as appropriate. They were derived using factor analysis, and were constructed so that values fall between 1 and 5. The factor loadings shown below are estimates of the strength of the relationship between the opinion item and the underlying factor on a scale of –1 to +1. All attitude scales used in the analysis had acceptable reliabilities (α coefficient) of over 0.6 – see below for each scale.

Note Items with factor loadings are in brackets:
1970 cohort at age 30; 1958 cohort at age 33; 1958 cohort age 42. The reliabilities of the scores are also shown below each section.

Race tolerance

"I would not mind if a family from another race moved in next door with me" (0.83; 0.81; 0.81)
"I would not mind working with people from other races" (0.80; 0.78; 0.78)
"I would not mind if my child went to a school where half of the children were of another race" (0.75; 0.74; 0.72)
"I would not want a person from another race to be my boss" (0.73; 0.79; 0.72)
"It is alright for people from different races to get married" (0.70; 0.69; 0.67)
α = 0.82; 0.82; 0.80

Support for authority

"People who break the law should be given stiffer sentences" (0.70; 0.68; 0.70)
"Schools should teach children to obey authority" (0.65; 0.70; 0.66)
"Young people today don't have enough respect for traditional British values" (0.58; 0.61; 0.61)
"The law should be obeyed even if a particular law is wrong" (0.54; 0.55; 0.51)
"Censorship of films and magazines is necessary to uphold moral standards" (0.53; 0.51; 0.54)
"For some crimes the death penalty is the most appropriate sentence" (0.52; 0.52; 0.54)
α = 0.62; 0.64; 0.65

Political cynicism

"None of the political parties would do anything to benefit me" (0.77; 0.81; 0.77)
"It does not really make much difference which political party is in power in Britain" (0.77; 0.75; 0.76)
"Politicians are mainly in politics for their own benefit and not for the benefit of the community" (0.72; 0.68; 0.74)
$\alpha = 0.72; 0.65; 0.67$

Civic participation

Voting. Respondents who reported having voted in the last general election were classified as voters and those who had not voted 'non-voters'.

Voluntary Organisation Membership. Those people who reported past or current membership of any community, voluntary or charitable organisation were categorised as 'members' as opposed to 'non-members'.

Parent and Teacher Associations (PTAs). Respondents, who had children aged 5 or over and attended their PTAs were classified as 'participants' as opposed to parents who did not attend, who were classified as 'non-participants'.

Parenting behaviour (parents and children's survey – one third sample of cohort members – carried out in 1991)

Family meals. Respondents were asked how often during the week the family had a meal together and their responses recorded on a scale ranging from 'never' to 'several times a week', 'every day'. The numerical codes were treated as values on a continuous scale.

Reading to children. Respondents were asked how often during the week they read to their children and their responses recorded on a scale ranging from 'never' to 'several times a week', 'every day'. The numerical codes were treated as values on a continuous scale.

Book ownership. Parents were asked how many books were in the house. The number reported was treated as a continuous variable for one set of analyses and dichotomised to form a binary variable in another, with a cut-off point taken at 50 or more books.

Maths and reading attainment. The children were tested using the Peabody Individual Attainment Tests (PIAT) for reading comprehension, reading recognition and mathematical attainment. The scores were age-standardised using percentiles, i.e. the scores were transformed into ranks specifying one percent intervals of the distribution of the scores top 1%, top 80% and so on.

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